

THE IRON AGE

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Contents — June 6, 1935

Management's Golden Opportunity	9
Heat Treatment of Corrosion-Resistant Magnesium Alloys	10
Streamlined Comet Is of Unusual Construction	12
Testing Organic Finishing Materials for Metal Surfaces	14
Submersion Time vs. Quality of Hot Dip Zinc Coatings	16
New Variable-Speed Power Unit	18
Buckle Plate Design of Tanker Bulkhead	21
Modern Materials for High-Pressure Vessels	24
Divide and Conquer	27
Review of Composite Rolls in Use	52
Stainless Steel and Enameled Iron in Architecture	54
News	59
Automotive Industry	62
Washington	65
May Pig Iron Production	69
Statistics on Metal-Working Activity	70
Markets	71
Personals and Obituaries	92
Construction and Equipment Buying	94
Products Advertised	164
Index to Advertisers	186

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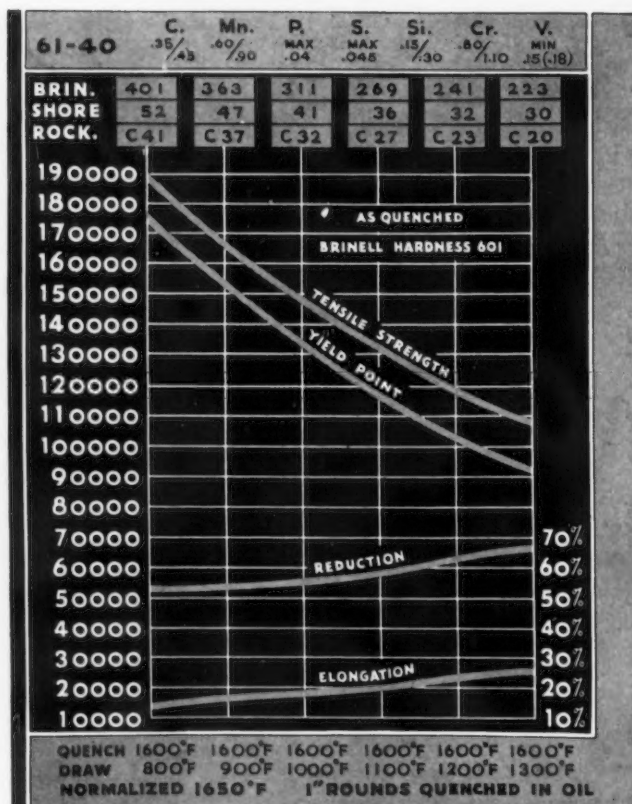
VI-Chrome-Vanadium Steels

THE characteristic property that vanadium imparts when alloyed with steel is finer-grained structure. The benefits of vanadium are not entirely reflected by the percentage that the steel contains. Vanadium is a strong deoxidizer and acts in that capacity when added to the molten metal. The effects of vanadium on the physical properties of a heat-treated steel are to promote ductility and accentuate the benefits of other alloying elements, such as manganese and chromium.

The chrome-vanadium steels, which come under the S. A. E. 61xx Series, carry from 0.80 to 1.10 per cent chromium and a minimum of 0.15 per cent vanadium. These steels are made with a carbon content in standard ranges of from 0.10 to 1.05 per cent. In the lower carbon ranges, up to 0.25 per cent, this type of steel is used for carburized parts, such as pneumatic-tool parts, wrenches, roller-bearing cones, pistons, and other uses subject to wear involving high stresses.

In the 0.35 to 0.45 per cent carbon range, chrome-vanadium steels find application as oil-hardened heavy-duty axles, shafts, driving parts, gears, pinions and similar parts. Because of its resistance to rapid deterioration when exposed to hydrogen gas at high temperatures and high pressures, this grade has also found considerable application in the chemical industry.

Chrome-vanadium steels in the 0.45 to 0.55 carbon range have been used in considerable tonnages



★ Physical properties of S. A. E. 61-40, a heavy-duty chrome-vanadium steel. ★

for flat springs. These steels have also been used for coil springs, mostly in the smaller sizes. In the automotive field a flat leaf of chrome-vanadium steel is sometimes used in conjunction with carbon spring steel (10-95) in the spring assembly.

In the higher carbon ranges, chrome-vanadium steel is applied only for special-purpose or heavy-duty work, as in rams, liners, anti-friction bearings, and machine-tool parts.



BETHLEHEM STEEL COMPANY

GENERAL OFFICES: BETHLEHEM, PA.

▲▲▲ THE IRON AGE ▲▲▲

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Management's Golden Opportunity

THE days immediately ahead offer both a test and a golden opportunity to the management of American industry.

It now has its first chance in two years to resume its customary role as the friend and protector of labor, a role that was wrested from it by brain trusters, bureaucrats and union organizers immediately upon the passing of the National Industrial Recovery Act.

Industrial relations have indeed been strained under NRA and the famous or infamous section 7-a which has now gone to the legal scrap heap. This section, driven through a labor lobby subservient Congress, set forth the principle that the interest of employers and employees are opposed; that they must be marshalled into opposite armed camps, the labor camp preferably under the banner of the American Federation of Labor or some other National union.

Opportunists in the fields of politics and labor seized upon this Administrative endorsement to parade the national stage in old time melodrama fashion. Bureaucracy and union labor were the heroes of the play—the champions and rescuers of fair labor, sorely pressed and harassed by the wicked villain employer.

Now management once more has its chance to resume the part that it should play and has played as the friend and champion of the workers in industry. The way to play that part effectively and convincingly is steadfastly to refuse to take advantage of the present situation and to maintain present wage rates and working hours.

If management plays its part in that way; if it now demonstrates its voluntary good will toward its workers, the cause of industrial relations will be immeasurably advanced and the philosophy of cooperation will replace the recently fostered doctrine of antagonism.

If management does not play its part in this way; if it abuses its new found liberty by cutting established wages or stretching established hours, it will be giving the cause of unionization the greatest boost that it has ever had in this country, and it will be inviting a constitutional amendment opening the way for the general regulation of hours and wages and probably of other industrial management policies and practices.

J. H. Van Derveer

Effect of Heat Treatment on Corro And Magnesium-

By TAKEJIRO MURAKAMI



THE industrial applications of magnesium alloys have been increased to a great extent within recent years and, thereby, an extensive corrosion test has been very desirable. No systematic research relating to the effect of heat treatment on corrosibility of magnesium alloys has been published. Consequently the following data were secured in order to determine the effects of annealing, quenching and tempering on corrosibility of magnesium-zinc and magnesium-aluminum alloys, as compared with the "as-cast" state.

The magnesium used in these tests was of about 99.86 per cent purity as prepared by Chemische Fabrik Griesheim Elektron. Alloys, of analysis shown in Table I, were melted in an iron crucible under a flux cover and were cast into a dry sand mold. A number of the cast specimens about 8 mm. in diameter were annealed, and the remainder were quenched in water followed by tempering at different temperatures. In order to find the effect of heat treatment on the quantity of added metal, the same heat treatment was carried out for several specimens containing different percentages of added metal in the range of solubility limit at the eutectic temperature. The heating was carried out in an evacuated quartz tube inserted into an electric tube furnace. Specimens thus prepared were finished to the uniform size of 5 mm. diameter and 30 mm. length. After cleaning with ben-

zol they were suspended by thin glass hooks vertically in glass vessels each containing 300 cc. of dilute sodium chloride solution, and after a definite time interval they were taken out, cleaned, dried, and the weight loss of each specimen was measured.

The five alloys, whose chemical analyses are given in Table I, were prepared and subjected to the following heat treatments:

Quenching: The alloys were quenched in water from 350 deg. C, after a heating lasting for 8 hr. at the quenching temperature.

Tempering: The alloys quenched as stated above were subsequently tempered at 160, 230, 290, and 350 deg. for 8 hr., followed by furnace cooling after each temper.

Annealing: Cast alloys were annealed at the following temperatures for 8 hr., and furnace cooled. The high temperature anneal for Zn 7, Zn 5, Zn 3 and Zn 2 alloys was at 340, 310, 230, and 230 deg. respectively. The low-temperature anneal for these same alloys was carried out at 270, 230, 130, and 130 deg. respectively.

Thus the annealing was carried out in the temperature ranges in which the alloys consist of single phase and of two phases, in order to compare the effect of these two cases. Specimens thus treated were immersed in 300 cc. of N/10 NaCl solution, and the weight loss of each specimen was measured after an elapse of 3, 6, 10, 17, and 25 days.

Results Are Tabulated

The first effect to be considered is that of tempering, and the re-

IN this article the authors present data on the corrosion resistance of cast, annealed, quenched, and tempered magnesium-zinc and magnesium-aluminum alloys. The effect of tempering on the corrosibility of magnesium-aluminum alloys is quite different from that of magnesium-zinc alloys; in the latter the corrosibility is a maximum when the precipitation of fine particles due to the tempering of quenched specimens is the

sults of these types of corrosion tests are shown in Tables II. The weight decrease observed on the specimens "as quenched" can be observed. Likewise, the effect of tempering is adequately shown by the figures in Table II. Note that the tempering effect is more marked as the zinc content increases and the progress of corrosion is more distinct as the immersion time is longer.

The increase of weight loss is gradual up to about 160 deg. C. and from that point to 230 deg. the increase is rapid, reaching a maximum at 230 deg.; thence it rapidly decreases, but at 350 deg. it slightly increases again. These facts may be satisfactorily explained by galvanic action; that is, the increase of weight loss up to 230 deg. is due to the separation of fine particles of a compound from the super-saturated

*Abstract of paper appearing originally in the science reports of Tohoku Imperial University, Sendai, Japan.

Corrosion Resistance of Magnesium-Zinc Aluminum Alloys*

and SUSMU MORIOKA

maximum, whereas the corrosibility of the former treated under the same condition is the minimum when the precipitation is the maximum. The authors have found that cast specimens corrode less than those of annealed or quenched ones; this fact leads to a justifiable conclusion that the heat treating of manganese alloys can be very acceptable and, likewise, rather harmful results can ensue.

solid solution, the separation being maximum at about 230 deg. The decrease of weight loss observed in the specimens tempered at over 230 deg. are attributed to the coagulation of separated particles due to high-heating temperature, resulting in an electrochemical dissolution of a smaller number of local cells than that when the particles are present in a fine dispersed state. The reason for a slight increase of weight loss observed in the specimens tempered at 350 deg., or those furnace-cooled from the temperature range of the single phase, may be attributed to the smaller size of the separated particles during cooling than those in specimens tempered at 290 deg. The corrosibility of tempered specimens thus largely depends on the amount and size of the separated particles.

The tempering effect is not vis-

ible in the microstructure of a specimen containing 7.15 per cent Zn tempered at 160 deg., but a microphoto of the same specimen tempered at 290 deg. will clearly show the separated particles.

The relation between the weight loss after immersion for 25 days and the quantity of added zinc is shown in Table III. It can be seen that the corrosibility is a minimum for the 3 per cent Zn alloy; in Table II note that the tempered specimens are more corrosive than those quenched, those tempered at 230 deg. being largest. The cast specimens are less corrosive than those quenched, excepting the 2 per cent Zn alloy.

Annealing Results Are Irregular

The effect of annealing at high and low temperatures was thoroughly studied, and the results for annealed specimens as compared to those cast are shown in Table III. In general, the alloys Zn 2 and Zn 3 are less corrosive when annealed at a high temperature than when annealed at a low temperature, but in the cases of Zn 5 and Zn 7 it is just the contrary. The results are very irregular owing to the fact that intensive pitting occurs during the corrosion of magnesium-zinc alloys. The cast specimens are, however, less corrosive than the annealed ones.

A microphoto of the cast structure of the 7.15 per cent Zn alloy will show a larger amount of compound than in the same specimen annealed at 270 deg.; this is due to the fact that the compound is partially dissolved on heating and

separated as fine particles during cooling.

The fact that the specimen Zn 7 which was annealed is markedly attacked may be due to the presence of compound which appears as finely dispersed particles on the prolonged heating, while the compound is segregated as the aggregated mass in the cast state. Hence it may be assumed that the effect of annealing depends on the size of particles of compound separated and on the degree of super-saturation of the solid solution.

From the above experiments it has been concluded that the magnesium-zinc alloys are most resistant to corrosion in the cast state, and heat treatments, such as quenching, tempering and annealing increase the corrosibility; therefore, the alloys of this series can be most properly used in the state as cast with respect to resistance to corrosion.

Mg-Al Alloys Are Tested

Five alloys of magnesium-aluminum system were prepared by casting in a dry sand mold. The chemical analysis of these specimens are shown in Table IV. These alloys were heat treated as follows:

Quenching: Specimen Al 11 water quenched after heating for 6 hr. at 440 deg.; specimen Al 10 water quenched after heating for 6 hr. at 430 deg.; and specimens Al 8, Al 6, Al 4 water quenched after heating for 6 hr. at 420 deg.

Tempering: After quenching as above, the specimens were tempered at the following temperatures for 5 hr. and then furnace-cooled.

(CONTINUED ON PAGE 46)

Streamlined Comet Is of Unusual

THE Comet, the streamlined passenger train recently completed for the New York, New Haven & Hartford, is of unusual structural design. It is best described as a tube with flat sides

and well-arched roof and bottom.

The main strength-carrying members for the tube consist of four built-up longitudinals running the entire length of each car at the four corners of the cross-

section. These longitudinal members, which take the place of the center sill and longitudinal framing of the conventional train, are held in place by the roof carlines, side posts and floor and, at the end



AT LEFT
The lower longitudinals are connected by a series of transverse floor beams braced by two stringers.

UPPER RIGHT
The outer ends of the two power cars are formed by arching the lower longitudinals and tying them in with a front post which forms into a "Y" to connect with the two upper longitudinals.

LOWER RIGHT
The end bulkheads are rigidly crossbraced.

BELOW
The main strength-carrying members of the cars are four built-up longitudinals at the four corners of the cross-section. These are held in place by the roof carlines, side posts and floor and, at the end of each car, are tied into bulkheads

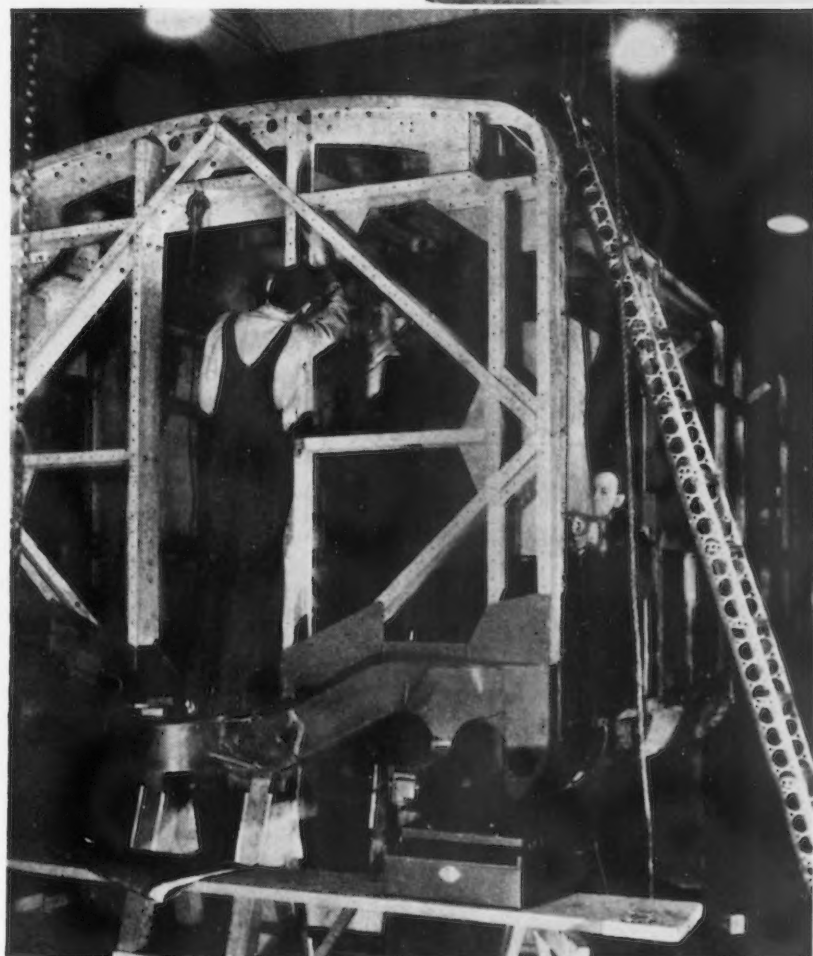
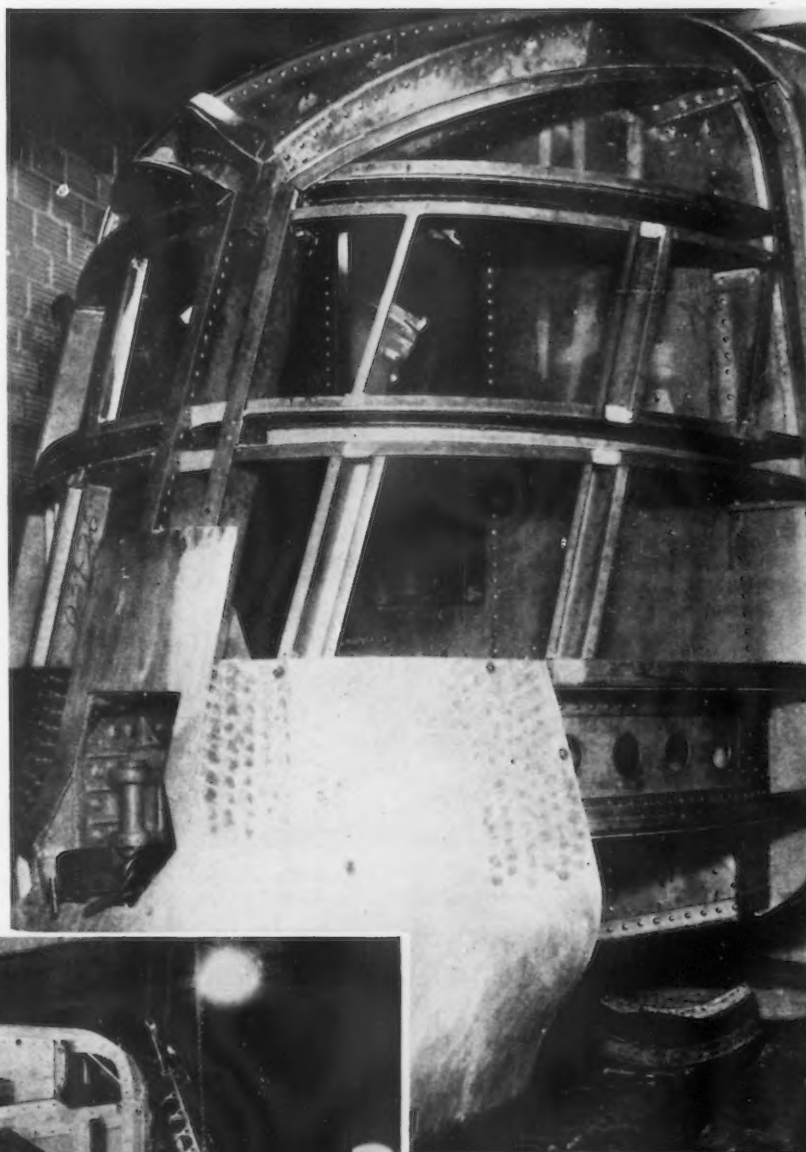


Construction

of each car, are tied into bulkheads rigidly crossbraced to transmit the stresses to the articulated connections. The framework is covered by an outside sheathing of sufficient strength and thickness to serve as the stress-carrying element.

The outer ends of the two power cars are formed by arching the lower longitudinals and tying them in with a front post which forms into a "Y" to connect with the two upper longitudinals. The pilot consists of a welded steel member riveted to the lower longitudinals and to a heavy shear plate. It also forms the compartment for the stationary draft gear and removable coupler.

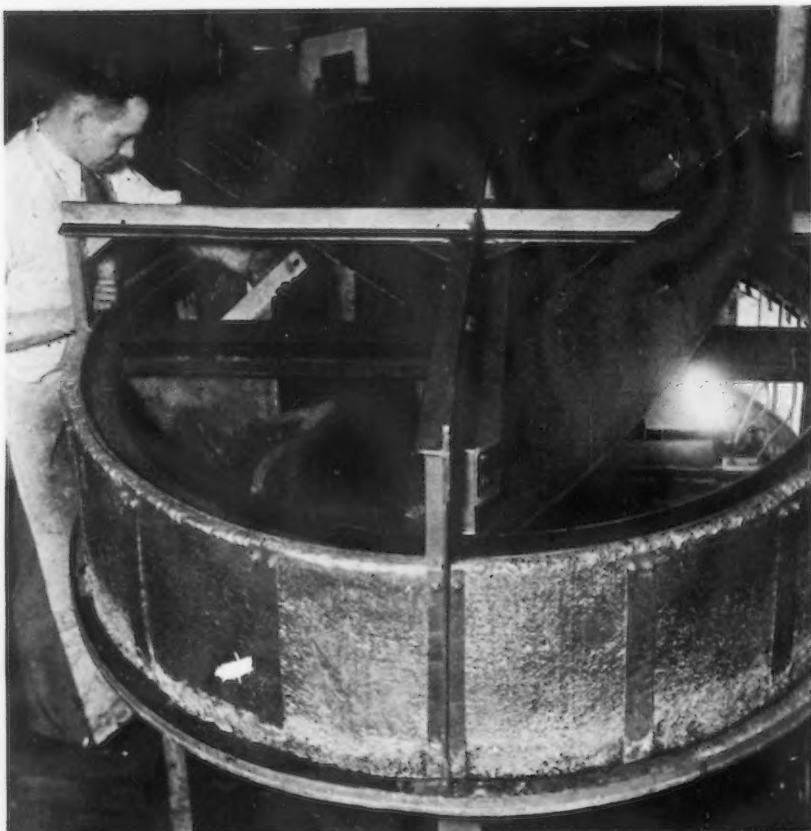
A series of transverse floor beams connected to the lower longitudinal members and braced by two longitudinal stringers forms the under frame of the Comet. The under side of the underframe is cov-



ered with aluminum sheet, while the car floor consists of Keystone flooring filled with cork and covered with sheet cork. The top flooring is rubber.

The underframe for the engine room of the two power cars is composed of a welded steel bedplate which rests on the lower longitudinal members, reinforced by aluminum castings. The bedplate, which also serves as the lower half of the crankcase of the Diesel engine, is formed by top and bottom plates reinforced with longitudinal and traverse bulkheads which provide a series of compartments for the storage of fuel, lubricating oil and water. The section of the roof directly above the bedplate is so designed that it can be readily taken off in order to facilitate the removal of the engine from the car.

(CONTINUED ON PAGE 50)



ACCCELERATED weather test for determining durability of finishes. The finishes are subjected to water, heat and ultra-violet light successively.



CUP for determining viscosity. Cup is placed in the material and allowed to sink as the material flows in through the orifice.

Testing Orgar

MANUFACTURERS of organic finishing materials are doing an excellent job in the development and marketing of their products. They have made available virtually countless types of finishes that may be applied in innumerable combinations to obtain protective or decorative finishes on metal. With the great number of materials on the market, however, design engineers frequently are at a loss to select at random materials that will more or less assure maximum results.

The problem of selecting suitable materials therefore is, paradoxically, becoming more complex with the increasing development of new paint products. Large manufacturers of metal products have long recognized the importance of this problem and maintain on their staffs design engineers, or finish engineers, whose duties deal directly with the study and selection of new finishing materials, combinations of finishes and other phases that are closely related to the ultimate success of a metal product in consuming fields.

o o o



PERHAPS the most important step in attempting to solve finishing problems is the testing of the available materials. At the Westinghouse Electric & Mfg. Co., East Pittsburgh, it is the function of the design or finish engineer to possess sufficient basic information on all types of finishing materials to enable him to select from the many types of finish-

* Material and process engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

gar Finishing Materials for Metal Surfaces

By B. V. McBRIDE* and GEORGE EHRNSTROM, JR.

ing materials those which are best suited to the application involved. A section of the company's chemical laboratory is devoted to the testing of finishing materials for durability and physical characteristics, and to the developing and testing of the complete finish, which may consist of one or more coats of the same or different materials.

Chief Objective Is Durability

Most metal products manufacturers, who are directly concerned with finishing problems, are agreed that the chief objective is durability, with appearance and cost next in importance. From a group of organic finishing materials that may be considered to be satisfactory for durability, many can usually be eliminated as being unsuitable from the standpoint of appearance or cost, leaving a smaller, selected group to be subjected to a series of tests that are designed to cover conditions of exposure and application. In large companies, this preliminary elimination is facilitated by the basic knowledge of the finish engineer.

The next logical step is to observe finishes or finishing materials under conditions identical with those to which they will be subjected in actual service. The time required for such tests, however, is usually so long that it is common practice to use accelerated test methods which are closely related to the actual service conditions. Numerous accelerated tests have been devised to anticipate the resistance of finishing materials to various exposure conditions, to determine their performance under various methods of application and to examine their physical characteristics. A fairly thorough description of test methods and test

apparatus has been given by H. A. Gardner in the sixth edition of "Physical and Chemical Examination of Paints, Varnishes, Lacquers and Colors."

The examination of finishing materials at the Westinghouse com-

pany proceeds in two steps: First, to examine the materials, as received, for stability, viscosity, solids content, drying time, hiding power and working properties; second, to examine the dried films

(CONTINUED ON PAGE 56)



HUMIDITY chamber. Test panels are inserted in the sides; also a rack on the bottom is provided for subjecting small pieces to high humidity atmosphere. Temperature of water is maintained at 110 deg. F.

Submersion Time Versus Quality of



THE art of galvanizing is gradually changing from a process formerly operated by "rule of thumb methods" and practices passed on from one generation to the next by "word of mouth," to one of definite scientific principles aided by modern mechanical and automatic equipment. The change has been gradual, of course, but it may now be said that the hot-dip zinc coating industry has definitely passed out of the "guessing stage" to one of modern scientific control. The best evidence of this fact is the control of the galvanizing bath temperature.

Beyond the use of modern mechanical equipment, however, is a realm of scientific facts and practical data much harder to penetrate. The reason for this is that the facts are unorganized and unsystematized, and also because these data are so numerous and varied. In practice the results are confused due to the large number of variables involved, and it seems to be a hopeless task for a man working under practical operating conditions to definitely fathom out any rule or principle that will stand up to repeated tests for its accuracy. The truth of this statement can readily be appreciated when the results of a study of just one factor, the submersion time in the zinc, are given.

In this article, it will be assumed that all other galvanizing conditions have been standardized except the submersion time in the molten zinc; the submersion time will be varied and the effect noted upon the character of the zinc coating obtained, and also upon the finish or appearance of the coating.

Zinc coatings may be broadly classified into two general classes, namely, those with a spangle and

those without a spangle. In a previous article, which appeared in THE IRON AGE of Nov. 22, 1934, a rough classification of spangles or crystallization effects upon zinc coatings was given. At this writing an attempt will be made to definitely organize and systematize the effects on a zinc coating of different submersion times in a galvanizing bath.

The characteristics of zinc coatings definitely affected by a change of submersion time, when all other factors are constant or standardized, are as follows:

- (1) The spangle, or crystallization effect.
- (2) The finish of non-spangled coatings.
- (3) The thickness of the coating.
- (4) The iron content of the coating.
- (5) The weight of the coating.
- (6) The bending qualities of the coating.
- (7) The smoothness of the coating.
- (8) The lustre of the coating.
- (9) The adherence of the coating to the base metal.

Long Submersion Destroys Spangle

The spangle, or crystallization effect on galvanized iron is affected by so many different things that it seems almost like a hopeless task to even attempt to organize or classify what is found. A concentrated effort, however, has yielded some information which is believed to be reliable. To illustrate this point, Fig. 1 shows a 28 gage steel sheet held in a galvanizing bath for exactly 5 sec., at a bath temperature just 4 deg. above the melting point of zinc. Fig. 2 shows a 28 gage steel sheet held in the same galvanizing bath at exactly the same temperature and under identical conditions, except that the submersion time in the zinc was exactly 2 min. Fig. 3 shows a 28 gage sheet held in the same galvanizing bath at

THE greatest difficulty in galvanizing engineering is to locate the right cause for any given result obtained. With a great number of variable factors, the same result may be obtained from many different causes. Nevertheless, the submersion time has a definite influence on the quality of zinc coatings, and it is of interest to ex-

actly the same temperature and under identical conditions, except the submersion time in the zinc was exactly 4 min. Many other tests have been made at submersion times between 5 sec. and 4 min., but the results are very well demonstrated by selecting these samples for illustration.

A few fundamental facts stand out clearly as a result of these



FIG. 1.—Typical zinc coating produced on a 28 gage steel sheet held in the bath exactly 5 sec. at a bath temperature of 790 deg. F.

Hot-Dip Zinc Coatings

By WALLACE G. IMHOFF
Galvanizing Consultant, Vineland, N. J.

amine this influence when all other variable factors are kept as constant as experimental conditions permit. In this article, Mr. Imhoff presents the results of numerous experiments of this nature and concludes with nine definite principles concerning the relation of submersion time and type of zinc coating produced.

tests. First the illustrations show clearly that a long submersion time will eventually destroy the spangle or crystallization effect altogether. It very clearly brings out the fact that the submersion time has a very definite relation to the appearance of the coating. This fact is important inasmuch as appearance of the coating in some fields of galvanizing, such as metal

ware, is an important factor in sales.

The illustrations submitted do not show the size of the spangle so clearly but they do show the effect of the longer submersion time in the zinc. After a study of spangles on many other samples, it is seemingly evident that there is a definite galvanizing principle involved in so far as the spangle or crystallization effect is concerned. This principle may be stated as, the shorter the time of submersion in the galvanizing bath, the smaller the spangle; and, conversely, the longer the time of submersion in the galvanizing bath, the larger the spangle.

The finish of non-spangled galvanized coatings is also very definitely affected by the submersion time in the galvanizing bath. The finish of non-spangled galvanized coatings is smooth and metallic. When the submersion time in the bath is too long these coatings start to get rough. This is often demonstrated in plant operation when a piece of material is lost in the bottom of the pot. Even after a short time the surface becomes very rough and, if left in the bath over night or for a longer period, the coating assumes a granular, dross-like appearance similar to that shown in Fig. 3. The definite galvanizing principle here illustrated for non-spangled coatings is, therefore, the longer the submersion time in the galvanizing bath, the rougher the zinc coating.

The next question is what relation does the submersion time in the galvanizing bath bear to the thickness of the zinc coating deposited? These facts are very clearly illustrated also by the illustrations shown in Figs. 1, 2, and 3. In Fig. 3, it can plainly be seen that the coating is very much thicker than in Fig. 1. In order

to show this, the finger nail was placed under the coating and the upper left hand corner of the coating broken off. This could not be done with the coatings shown in Figs. 1 or 2. The difference in the thickness of the coatings deposited on these sheets is clearly shown, and may be summarized in the following definite galvanizing principle, namely, the longer the submersion time in the galvanizing bath, the thicker the galvanized coating will be; and, conversely, the shorter the submersion time in the galvanizing bath, the thinner the galvanized coating will be.

Iron Causes Brittleness

Already it can be seen that to furnish actual data and figures for every point concerned would be a tremendous task. While the writer has tested and analyzed many galvanized coatings for their content, still it is difficult to present exact figures to illustrate the relation between the iron content of the coating and the submersion time. To illustrate this point, therefore, it will be necessary to draw on practical experience.

Those familiar with galvanizing know that the longer an article is left in the galvanizing bath, the more brittle it becomes. Various tests that are available with chemical analyses show that this brittleness in the zinc coating is due to the iron content. It has been found that very ductile coatings contain only a small amount of iron. Also it is well known that the coating is very thick, very heavy and very brittle on pieces that have been lost in the bath for some time. Those experienced in the art of galvanizing know that this brittleness is due to a heavy increase in iron content in the zinc coating.

It may therefore be stated from
(CONTINUE ON PAGE 124)



FIG. 2—Same type of sheet as in Fig. 1 with the exception that the submersion time has been lengthened to 2 min. Bath temperature is retained at 790 deg. F.

New Variable-Speed Power Unit

Utilizes Pressures of Torque Load



POWER is transmitted through hardened steel rollers, under pressure contact with hardened steel races, in a variable speed power unit being introduced by the New Departure Mfg. Co., Bristol, Conn., under the trade name "Transitorq." Figs. 1 and 2 illustrate the equipment.

Means are provided for automatic generation of pressure between the rollers and races, utilizing the imposed torque load as the generating element.

Fig. 3 illustrates the stationary

spider mounting of the rollers which transmit the drive from the constant-speed input race to the variable-speed output race. The position of the rollers, in respect to centers of the races, is adjustable and the action of changing

position must create variation in the speed of the output race, with a selectivity range limited by the race diameter. The bearings carrying the rollers are designed to provide an inclinable movable position for the rollers.

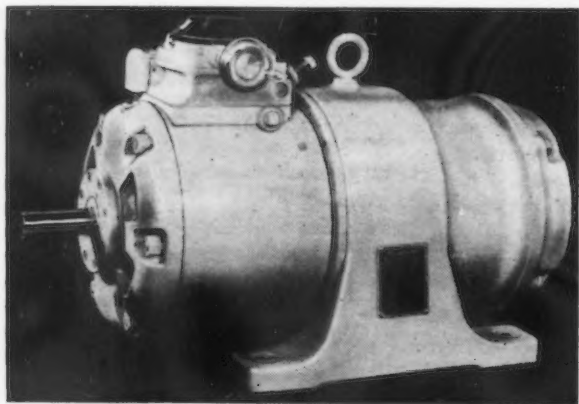


FIG. 1

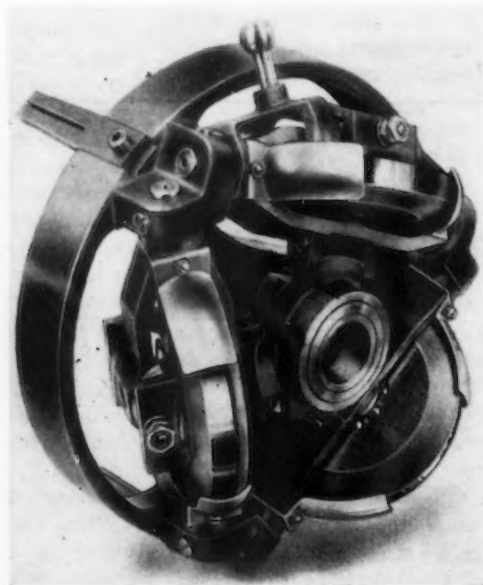


FIG. 3

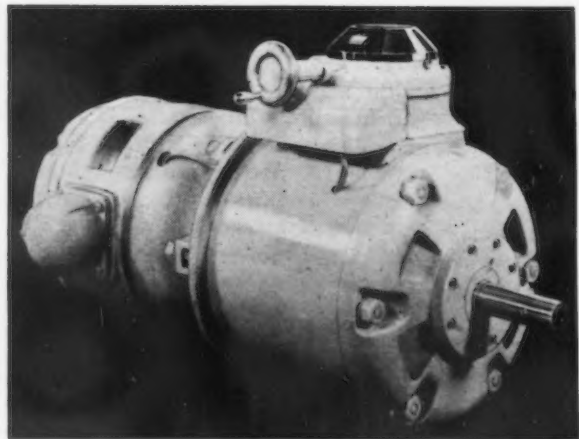


FIG. 2

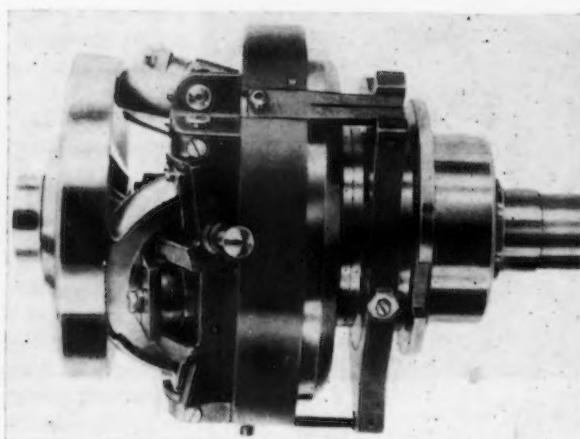


FIG. 4

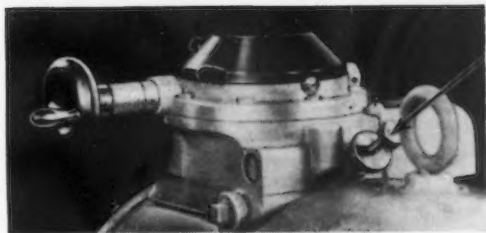


FIG. 6



FIG. 5

Fig. 4 illustrates the assembly of the variable-speed mechanism, the input race, the output race, and the intervening rollers and roller-carrying members; adjustable as to position and inclinable through either manual or automatic operation of the speed-control unit.

Speed Control Mechanism

The speed-control mechanism, Figs. 5-2, mounted on top of the power unit, consists of two parts—the first an indicator dial, the second, a rotor or vane. The dial is mounted on a circular, vertically positioned housing. The housing is rotated by a worm and gear, either by hand wheel or by remote control. The vane is within the circular housing and is connected to a vertical shaft which operates the roller shifting mechanism. In operation, at the starting of the power unit, oil under pressure from the power

unit pump, enters the circular housing behind the vane and moves the vane around against spring pressure until it reaches a stop in the housing. The position of the stop is determined by the output speed at which the indicator has been set. With the power unit running, the vane is kept in contact with the stop hydraulically and turning of the hand wheel rotates both members as a unit, increasing or decreasing speed as desired. Should the power unit be stopped when set



FIG. 7

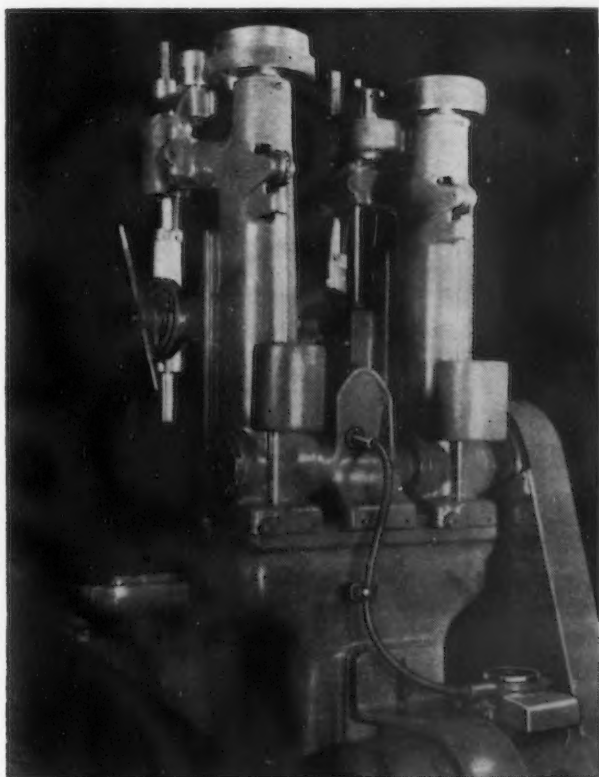


FIG. 8

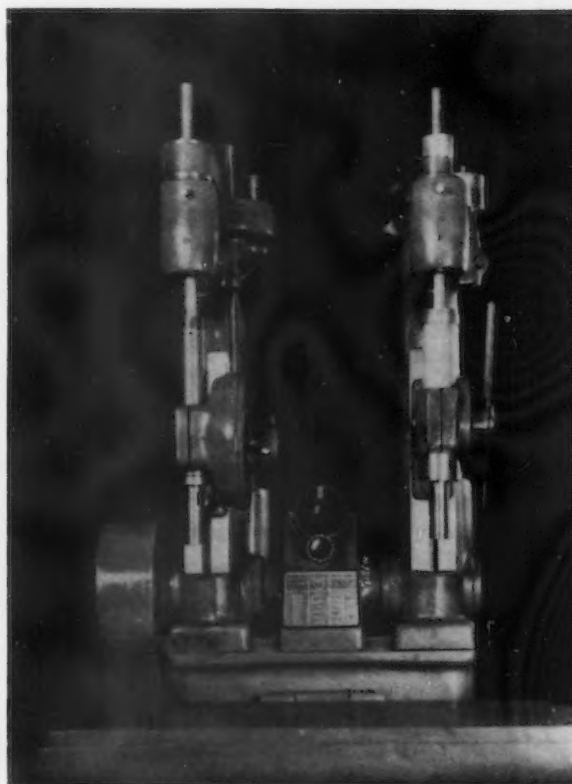


FIG. 8A

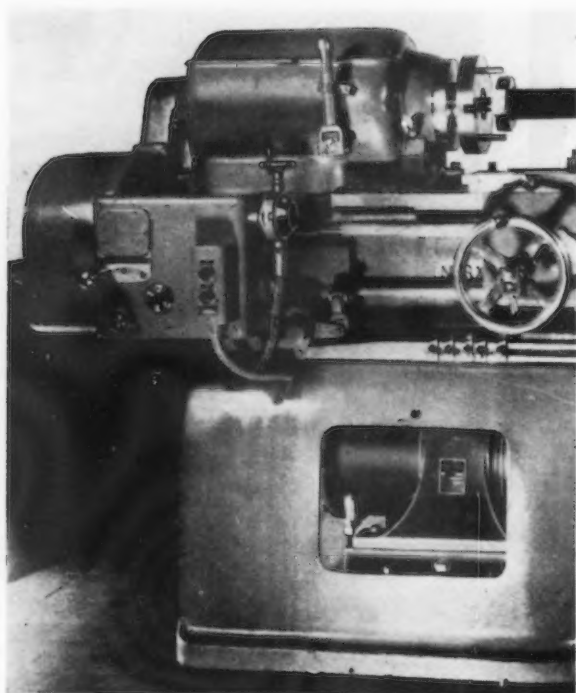


FIG. 9

for any speed between high and low, the oil pressure is automatically relieved and the vane shifts back, under spring pressure, to the low-speed starting position.

An adjustable valve, Fig. 6, on the speed control on top of the power unit, provides time regulation for change from low to any pre-selected speed. With the valve full open, the unit will accelerate from low to highest speed or vice versa, in three seconds.

In the power unit is a device for automatically regulating the contact pressure of the rollers upon the races and maintaining it in exact proportion to the imposed torque load. Stationary and floating torque-loading flanges, Fig. 7, are separated by three balls, equally spaced in inclined grooves. Because of the cam formation of the grooves, any slight rotary movement of the floating flange, in either direction, produces a definite axial movement which is communicated, as thrust, through

the high contact angle bearing to the variable speed output race. Since this race is located axially only by this angular contact bearing on one side, and the rollers on the other, an increase in contact pressure results. The traction of driving force acts in the same direction and a resultant tendency is for the spider carrying the rolls to rotate. The spider is non-rotatable and the rotating tendency is transmitted to the floating flange by

three steel fingers. Thus, whatever may be the cause, any change in imposed torque reflects in a change in roller tractive effort, a corresponding partial rotation of the torque flange, and a definite change in the roller contact pressure. Thus no pressure load is ever imposed in excess of torque requirements, yet the roller pressure is always equal to the amount of imposed torque.

No adjustments of any kind are required; ball bearings are used throughout, and there is but one point at which lubricant is entered. Motor shaft and output shaft are in line. All applications have a small hand wheel control, rotatable at finger touch, with speed ratio changes indicated on a sloping dial, Fig. 5.

Special Applications

Should any application require mounting in a position not within easy reach of the operator, the hand wheel is removed to permit of connection by flexible shaft, Figs. 8-8a. The speed control may be cam operated, Fig. 9, with cam contour worked out to meet requirements in speed changes during a cycle of operations within the speed range, and the minimum shifting time required by the power unit.

Electrical devices are available for operating controls over one or more machines so located that mechanical connection is difficult or impossible.



EIGHT to nine carloads of chassis frames are needed daily to meet the current production requirements of the Pontiac Motor Co. Two overhead cranes do the unloading job. The first picks them up two at a time and puts them in piles of eight on a dolly. The second crane—the one with a load in the air—slips its carrier under a pile of frames, picks them off the dolly and transports them to the far end of the building where they are deposited at the beginning of the assembly line.

Buckle Plate Design of Tanker Bulkhead

Reduces Total Weight and Number of Parts

AN interesting departure in design of bulkheads for tankers was brought to the attention of ship builders and ship operators with the testing of a scale model at the plant of the Lukenweld Division of Lukens Steel Co., Coatesville, Pa., on May 21.

As reported in *THE IRON AGE* of May 23, advantages of the proposed system of bulkhead construction, which is here illustrated, include savings in weight, and a reduction in total number of parts, in required stiffener area, and in the number of parts to be assembled at the shipyard. The saving in weight as compared with a conventional riveted bulkhead in a tanker with 66-ft. beam and 38-ft. molded depth, with two longitudinal bulkheads, is said to be about 25,000 lb., or 26 per cent. The reduction of required stiffener area is 30 per cent; in total number of parts, 32 per cent; and in number of parts to be assembled at the shipyard, 62 per cent. There is

also a reduction in length of welding at the shipyard.

Pressed Plates Integrated by Welding

The complete bulkhead is composed of a series of press-formed plates integrated by welding (Figs. 1 and 2). Each pressed plate combines two elements, namely, an elliptical bulge and one-half of two channel-shaped members. The latter are completed when the pressed

plates are welded together (Fig. 3).

The elliptical bulge is, it is stated, the proper shape for receiving the fluid pressure; it transmits its share of the fluid pressure load to the vertical webs by a complicated form of hoop tension. The channel transmits a share of the fluid pressure load to the same vertical web and preserves the transverse continuity essential for what-

FIG. 1—Appearance of a single buckle plate when split center longitudinally. Fig. 2—Appearance of a single buckle plate split vertically. Fig. 3—Four buckle plates joined by welding to form transverse channels.

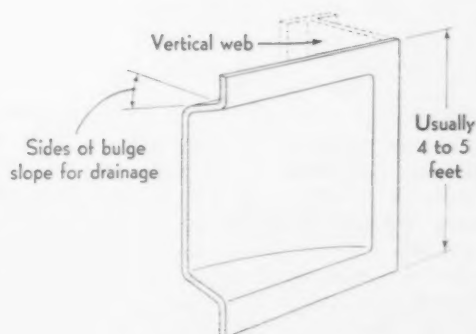


FIG. 2

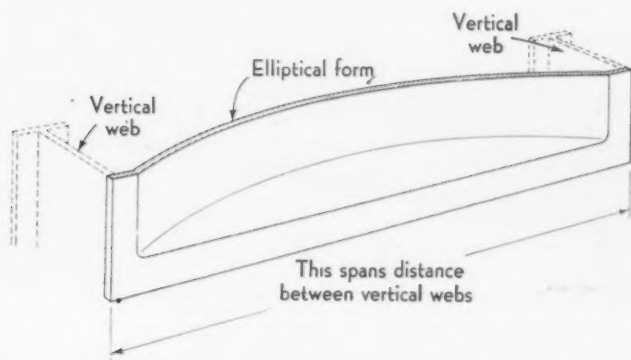


FIG. 1

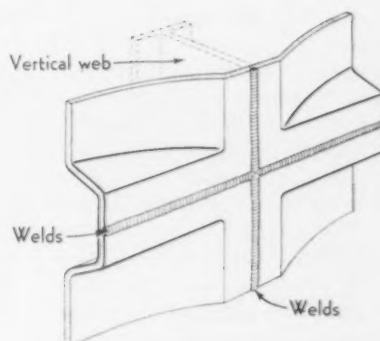


FIG. 3



FIG. 5—Front view of flat tank scale model after hydrostatic test. A piece 6 in. square was cut out of the upper buckle plate after test, to check the thickness of the metal.

ever diaphragmatic action may be necessary.

In commenting on this design, Everett Chapman, vice-president, Lukenweld, Inc., points out that ships at sea constantly undergo flexing, both torsional and bending. The moments from this flexing concentrate in general at the joints or junction of the component members. Properly designed and properly made welded joints result in a structure, the action of which is indistinguishable from that of a single piece of metal. With the welded construction, therefore, there can be no leaks due to the working of a ship in a sea, provided the design and execution of the structure are such that the plates do not actually separate or fracture.

Heretofore the typical bulkhead has been made up of two parts—that separating the two adjacent compartments and that which stiffens the first and makes it capable of resisting water pressure on one side. The proposed construction combines these two functions, and thus all the usual separate horizontal stiffeners are eliminated and the lateral stiffness is preserved by the integral channels.

BELOW

FIG. 6—Side view of flat tank scale model after the hydrostatic test.



The buckles are pressed by dies in individual plates. After trimming to size, as many buckle plates are shop welded as convenient for shipment to the shipyard.

The tops and bottoms of the buckle plates that form the trough-like channels slope 20 deg., leaving no place for oil to collect. Cleaning is greatly facilitated, as only the face plates on the webs and the flanges on the web brackets have blind surfaces to the front.

Emergency repairs can be made when necessary by the usual riveted construction, or a buckle plate of the same form can be fabricated by welding several plates together.

In a proposed all-welded tanker, about 1050 separate buckle plates of possibly two or three sizes are required in a boat 495 ft. long, with a tank capacity of about 5,530,000 gal.

Scale Model Unfractured at 131 Ft. Water Head

The hydrostatic test of a $\frac{3}{8}$ scale model of a flat tank with sides made up of three of the press-formed buckle plates resulted, as stated in the previous report, in no leaks nor fractures at a head of 131 ft., the limit of the test facilities. A 48-ft. head is required to meet American Bureau of Shipping requirements for tank construction.

The experimental test set-up is shown in Figs. 5 and 6. At 65 ft. of head, the first sign of flaking of the brittle whitewash with which the model was coated was observed at the point where the buckle plate was welded to the left inside of the frame on the concave side of the model. No further flaking of the whitewash was observed until at an 80 ft. head, the flaking increased downward from the original point, and also began at the right inside of the frame on the concave side of the model. The flaking continued up to 100 ft., at which head, flaking of the whitewash also began on the convex side, at the point where the buckle plate was welded to the left inside of the frame. At 115 ft. head, the top buckle plate on the concave side began to bulge, and this phenomenon was accompanied by white-

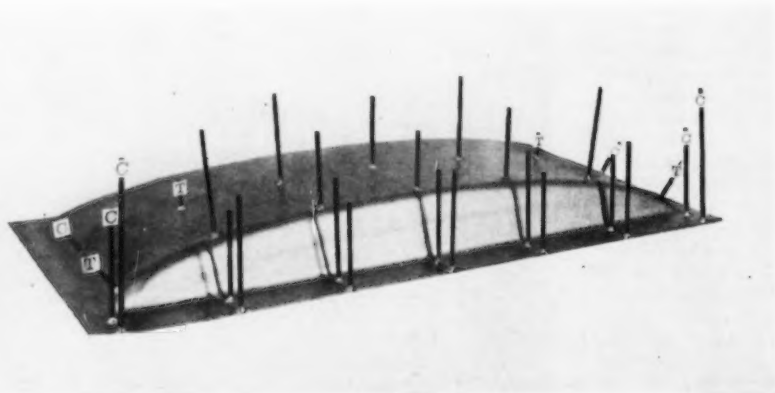


FIG. 7—Before the hydrostatic test, stress measurements were taken at various heads of water. The longest and shortest rods indicate the points of highest and lowest stress, respectively.

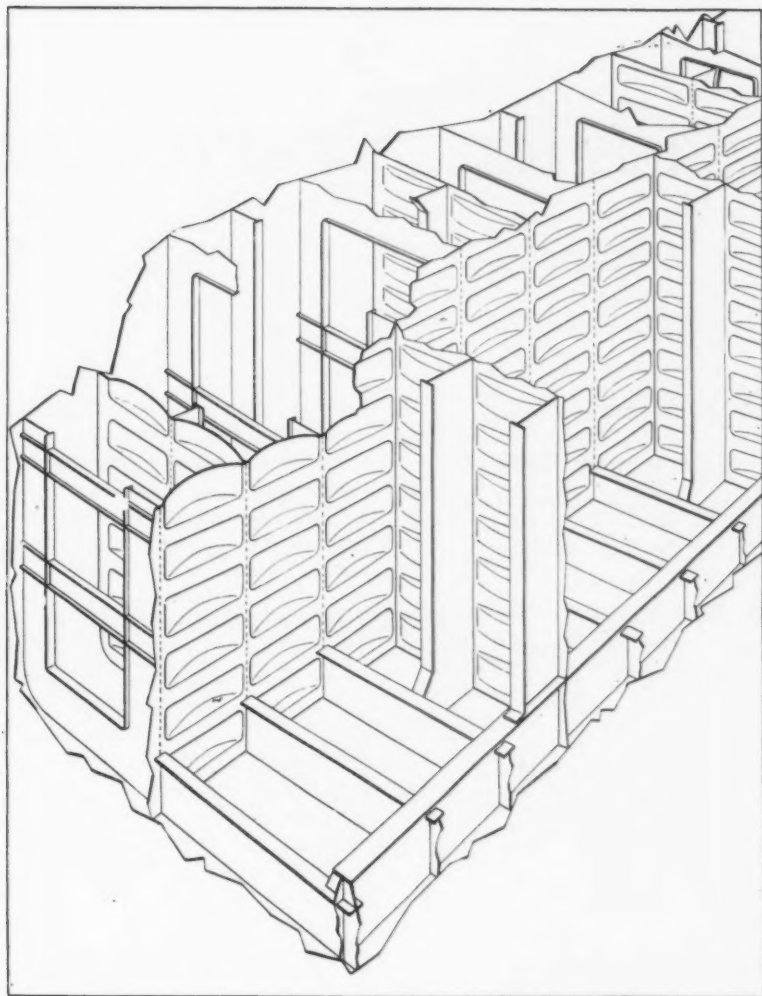


FIG. 4—This schematic drawing shows the general arrangement of the proposed bulkhead system in a tanker.

wash-flaking on the same buckle plate at the angle between the channel section and the top elliptical section. At the same time, the bottom buckle plate on the concave side began bulging, with white-wash-flaking at the angle between the channel section and the bottom elliptical section. At 120 ft. of head, bulging and flaking of the whitewash continued at the same points observed at 115 ft. head, and the center buckle plate on the concave side of the model also began to bulge outward. At 125 ft. of head, the entire concave side slowly attempted to take the form of one large convex bulge, with the bulge at the center of the middle buckle plate being out about 10 in. from its original position. As this occurred, the sides of the model bowed in, causing the channels on the convex side of the bulkhead to bulge out at their ends. At 131 ft. head, the highest head of water

obtainable, which was held for about half an hour, the bulkhead assumed the shape shown in Figs. 5 and 6.

The model was made of 0.20 per cent carbon steel, 3/16-in. thick, with a yield point of about 41,000 lb. per sq. in. and an ultimate strength of about 68,000 lb. Before the hydrostatic test, stress measurements were taken by means of Huggenberger extensometers at various heads of water to find the point of highest stress in the buckle plates. Stress models from data taken on these preliminary tests, with rods showing stresses at various points of the buckle plate (Fig. 7), were exhibited before the water head test to destruction of the model tank. The longest rods indicated the points of highest stress and the shorter rods showed the points of lower stress.

In the model tank, three buckles

were used so that the outside buckles would simulate the type of connection that the center buckle would have in actual service. In the experimental set-up, the bulges were placed so that the same pressure would be exerted on the concave side in the one case and on the convex side in the other.

New Stainless Steel Book Now Available

THE rapid strides made in the technology of stainless steels are exemplified in the much enlarged and partially rewritten second edition of the "Book of Stainless Steels," edited by Ernest E. Thum, and now offered for sale by the American Society for Metals, Cleveland.

A great amount of the new material, heretofore unpublished, appears in the chapter on arc welding of high-chromium irons, by J. C. Hodge and, also, in the chapters on various types of castings which was written by A. C. Jones. Many additional data are incorporated in the section devoted to 29 per cent chromium and 9 per cent nickel alloys, and the chapter on requirements of the petroleum refineries has been revised by E. S. Dixon. Although these changes are the most conspicuous, most of the other chapters have been altered to conform to discoveries and new developments which have appeared since the publication of the first edition.

Bantam Ball Bearing Adding to Plant

THE Bantam Ball Bearing Co., South Bend, Ind., has placed a contract with Platz & Gill, South Bend contractors, for an addition to plant. W. W. Schneider is architect.

The new unit will enlarge the company's floor space 60 per cent, and is in line with a general expansion program based on the assurance of sharply increased bearing orders from customers in the automotive, steel mills, machine tool and allied industries.

In addition to increasing floor space, the company has recently augmented its mechanical facilities for the handling of machining, heat treating and grinding by over 50 per cent, and further developments are being planned in this connection at the present time.

Modern Materials for High Pressure



TEN to fifteen years ago boiler plate with a tensile strength of 75,000 lb. per sq. in. was not believed fit for fabrication. Common opinion label such steel as *hard*, but currently there is a general opinion that the 55,000 minimum tensile strength steel, equal to specification S-1 of the American Society of Mechanical Engineers Boiler Code, is losing its popularity, particularly in heavy walled shells.

Sometime ago, designers turned from butt-strapped joints to fusion welded beams, and with welding came restrictions on material which the process of riveting did not demand. Fabricators realized and welding experimenters discovered that in large sections or heavy plates some lack of uniformity in chemical composition presented problems in obtaining ductile welds. Therefore, at the introduction of the metallic arc, the steel manufacturers found themselves confronted with a demand for more uniform steel to permit acceptable welded joints.

The demand for a more uniform base metal was naturally followed by extensive experimentation and development in welding technique and procedure. Next the carbon content in the boiler and firebox grades of steel was limited to 0.35 per cent maximum. This restriction, although seemingly a natural one from the fabricating group, made it practically necessary that heavy plates be no longer produced of open or rimming steel, and required a killed or deoxidized steel by which process the carbon content could be maintained more uniformly from end to end of large plates, thereby offering to the welder for his seams more homogeneous and uniform edges.

*Abstract of paper presented before the annual meeting of National Boiler and Pressure Vessels Inspectors, Chicago, May 16.

By L. P. McALLISTER

Lukens Steel Co., Coatesville, Pa.

Demands for higher boiler pressures resulted in thicker shells, and to meet or overcome some restrictions of fabrication the boiler code adopted two new higher tensile steels, namely, specification S-26 and specification S-27, respectively calling for 70,000 lb. per sq. in. minimum tensile strength for plate material up to and including 2 in. and over 2 in. up to and including 4 in. This action was a decided step forward, as it recognized the advisability of higher strength material balanced by good ductility and workability. Many tons of plates have been rolled and numerous heads have been flanged on this so-called high-tensile grade. Success to date has been rewarded by an increasing demand for this 70,000 lb. per sq. in. minimum material.

Alloying Adopted

The next step in developing plate material presented a new angle: welding technicians advised against higher carbon, so to meet the still pressing requests for high strength, alloying elements have had to be added to the plain carbon analyses. The properties of plain carbon steel, through long usage, have become fairly well known as have its economic limitations. However, with the advent of additional and sometimes singular properties inherited from contained alloy, boiler and pressure vessel plate and head material presents a new economic aspect for consideration. When planning alloys for plate material, the first incentive is to produce higher strength without unproportional loss of ductility. High strength in sufficient increments

naturally permits a decided decrease in wall thickness and weight, and thereby presents for comparison a saving in purchased weight. The use of alloy steel may perhaps be more economically justified when due consideration is given to such factors as decreased purchased weight, reduced transportation costs on this lighter weight material both in the unfabricated and the fabricated state, possible lower shop costs due to the welding of thinner shell sections, and the metallurgical advantages derived from contained elements. Prevailing fabricating methods and welding technique must be given due regard in new steels. Little, if any, advantage would result from superior quality alloys if fabrication and welding could not be carried out with success.

All designs today, which follow the code construction of either The American Society of Mechanical Engineers or American Petroleum Institute, are based on a safety factor of 5 or 4, and working stresses of ordinary steel are used as engineering data. Much work is to be done to prove that higher strength, properly balanced alloy steel can present to the designer permissible stresses above those now set down for plain steel. A joint committee is at work and shortly it is believed that new and higher allowable working stress tables will be adopted, thereby permitting advantage to be taken of the higher physical properties. To be fair and safe, much technical data must be collected and summarized in order that designing engineers, operators and inspecting groups may have confidence in the values.

From judiciously mixed or single alloys one should expect some or combinations of several of the following properties above those obtained in ordinary plate stock.

Boiler and Pressure Vessels*

(a) High strength at elevated temperatures.

(b) High impact resistance at upper working temperatures.

(c) Definitely improved creep values.

(d) Good sub-zero impact ratings.

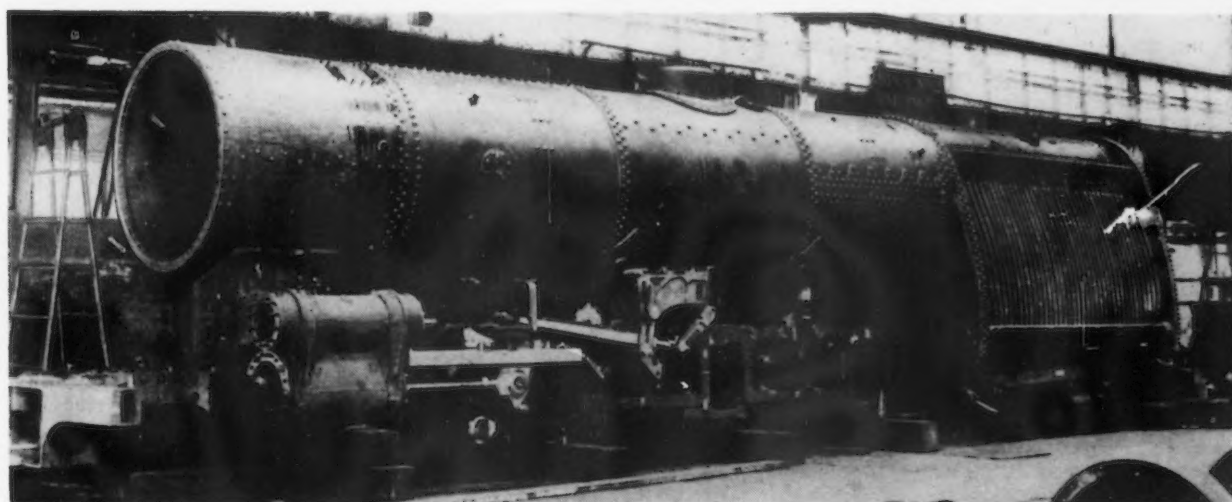
(e) Added resistance to some corrosive media.

(f) Better fatigue results.

The steel metallurgist has been

forced to select suitable alloying elements to provide some of these improvements in large plate form.

The automotive engineers have had at their command for years many alloy combinations, and tube



BOILER and firebox made of nickel alloy steel for one of the new high-speed streamlined steam locomotives, the Lord Baltimore and Lady Baltimore, of the Baltimore & Ohio Railroad. These locomotives carry 350 lb. boiler pressure.



FUSION-WELDED pressure vessels fabricated from nickel-clad steel. The vessels were designed for a working pressure of 100 lb. per sq. in., with stress carried only in the steel. All welds were X-rayed. Each vessel measures 23 ft. in length and 72 in. in diameter, and were fabricated from the largest corrosion-resistant clad metal plates ever rolled. The plates measured 118 in. in width, 228½ in. in length and 9/16 in. in thickness, with 20 per cent nickel-cladding on one surface.

buyers likewise have had a fairly broad field from which to select. Remembering this fact that the production and fabrication of small parts does not present the hazard that mass does, vessel and boiler material must come from alloy analyses which can be readily produced and constructed. Thermal effect on large and heavy sections has to be dealt with and, consequently, shell and head materials are today available in alloy steels which are not so sensitive to the various stages of making and shaping. Thus the fear of hazardous workability must not be foremost. Note should be made here that for welded construction, the codes have listed among acceptable specifications only plain carbon steel for shell fabrication and, however significant this fact may be, the day is not far distant when several alloy combinations must become essential parts of material specifications. High strengths are not at their maximum and as the welding art has changed its acceptable standard, so will limits of pressure, temperature and base material;

and the next great step will undoubtedly be to base material having a minimum of 100,000 lb. per sq. in. tensile strength. The demands are present, the methods of production and fabrication are progressing and developing by experimentation, and slowly but safely is being gathered the knowledge needed for achieving this goal.

As stated previously, alloying elements for plate construction must not, for sensible fabrication, exhibit pronounced air hardening characteristics. The application of intricate or even simple heat treatments are not always advisable; quenching and tempering and long time furnace annealing are always accompanied by out of flatness and warpage, making plate fabrication difficult, if not impossible. Therefore, in existing developments, steels are being offered which have the improved qualities in the "as rolled" condition. Keeping this problem foremost, the full benefit of all the nonferrous elements cannot be had. Equipment to some extent limits the production of the more special alloys re-

quiring special treatments, but with the hoped-for industrial expansion it is to be expected that progress will not be retarded.

Nickel, chromium, silicon, molybdenum and vanadium are the common alloying elements which have been used with remarkable success. By use of small percentages, steel makers have been able to produce some of the qualities which should be expected from a higher base price material. One of the chief outstanding metallurgical advantages of the use of the elements mentioned is the maintaining of high strength by substituting one or more of these elements for increased percentages of carbon. Thus, with the so-called low alloy content steel, carbons need not exceed or even reach the limit of maximum 0.25 per cent, as used in a 55,000 lb. per sq. in. tensile strength steel, to produce tensile values over 50 per cent higher than this figure. This advantage undoubtedly is attractive to the welding engineer.

Unfortunately there has existed in the minds of some users a suspicion or feeling of mystery about alloys. The metallurgical benefits from contained elements need only some understanding to alleviate such suspicion. Some regard for the properties imparted may slightly change fabricating methods, but not to such a degree that any ordinarily well equipped welder need fear his ability to construct. Nickel, chromium, silicon, etc., are used to improve the steel, not to make it more mysterious. Stiffness of alloy material is to be expected, but so long as brittleness does not accompany the higher strength, the resulting toughness is an advantage. All tonnage to date has been preceded by experimental work and it would not be amiss to discuss a few of the rather recently used alloy materials which have proved themselves worthy of the confidence intrusted to them.

Locomotives Use Nickel Steel

Two per cent nickel steel with carbon under 0.20 per cent, pioneered by a Canadian railway in a large locomotive construction program, has served so well that many of the States' railroads have installed wrapper sheets of this analysis. The tensile strength of 75,000 lb. per sq. in. permitted a decrease in shell section, and although subject to the stress of loco-

(CONTINUED ON PAGE 108)

TABLE I
Chemical and Physical Properties of 2 Per Cent Nickel Steel Plates

Analysis				Thickness in Inches	Yield Point, Lb. per Sq. In.	Tensile Strength, Lb. per Sq. In.	Elongation, Per Cent in 8 In.
C	Mn	Si	Ni				
0.13	0.52	0.20	2.10	1/2	52,500	76,000	28.00
0.16	0.56	0.21	2.25	3/4	44,000	75,000	28.50
0.16	0.57	0.25	2.08	7/8	47,000	75,600	26.00
0.17	0.66	0.23	2.23	1	49,300	82,000	26.25
0.16	0.56	0.21	2.25	1	46,600	75,500	29.00
0.18	0.68	0.19	2.90	2	47,800	79,000	23.70

TABLE II
Charpy Impact Values in Ft.-Lb. for 2 Per Cent Nickel Steel Plate

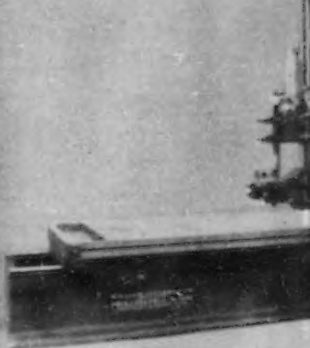
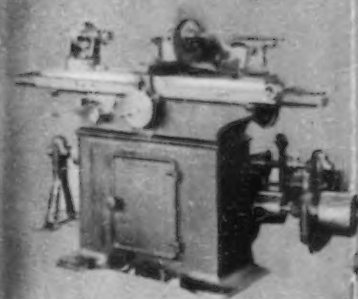
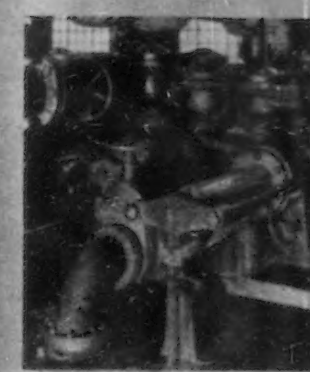
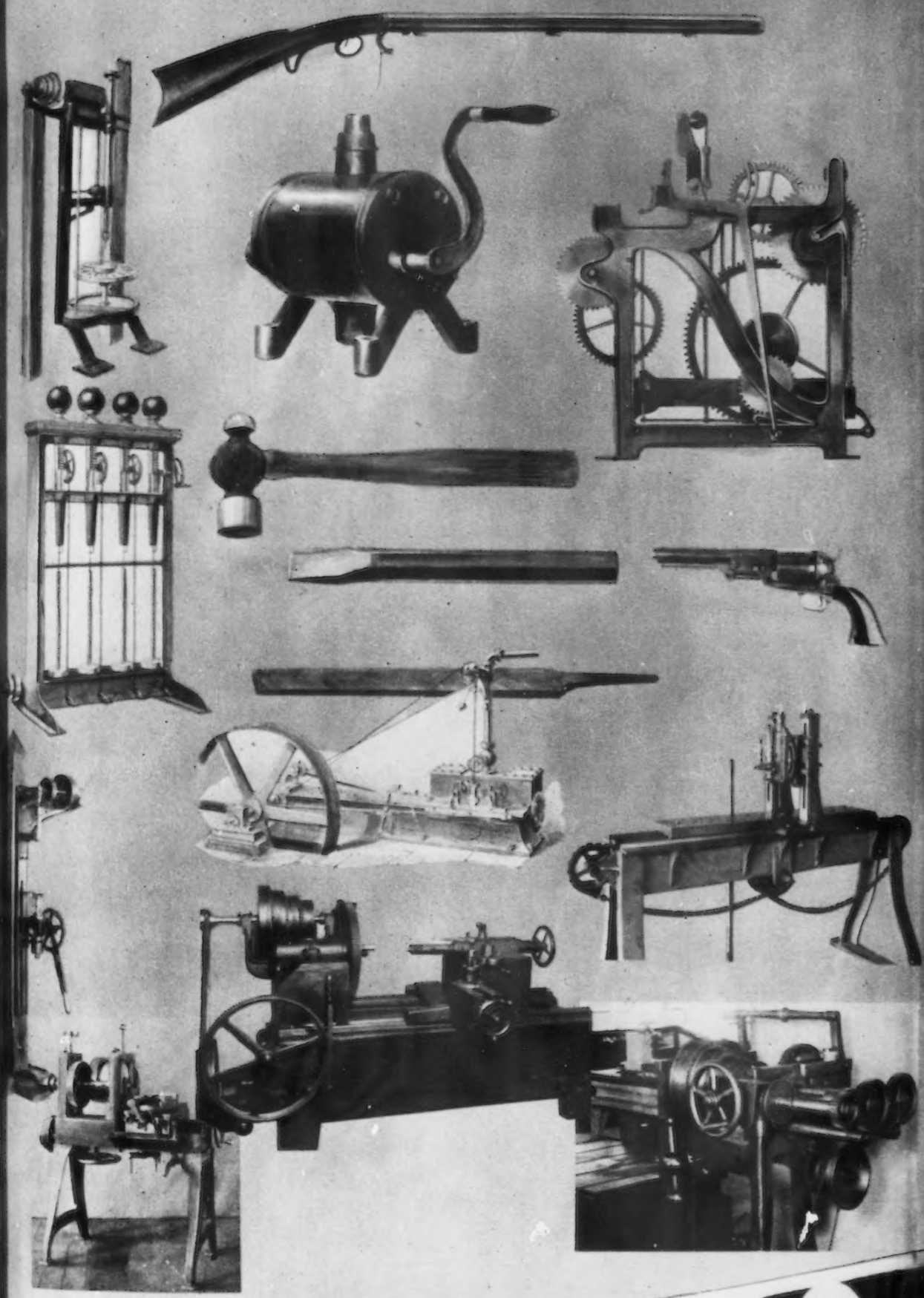
Analysis				Thickness in Inches	At 50 Deg. F.	At 75 Deg. F.	Condition of Steel Tested
C	Mn	Si	Ni				
0.16	0.62	0.18	2.22	1/2	31-33-35	17-22-23	As rolled
0.15	0.49	0.19	2.03	3/4	31-29-34	19-21-22	As rolled
0.16	0.48	0.19	2.10	9/16	39-39-39	32-32-30	As rolled
0.18	0.54	0.19	2.10	15/16	35-38-36	20-24-20	As rolled
0.18	0.66	0.24	2.24	1 1/4	32-35-35	18-22-20	As rolled

TABLE III
Chemical and Physical Properties of Manganese-Vanadium Steel Plates

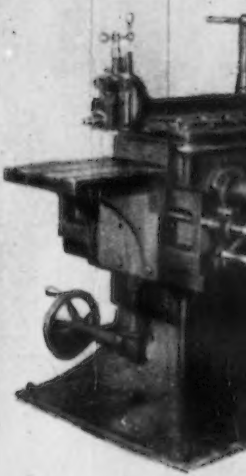
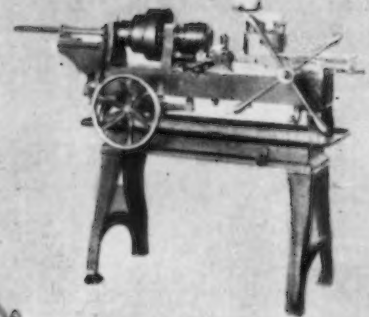
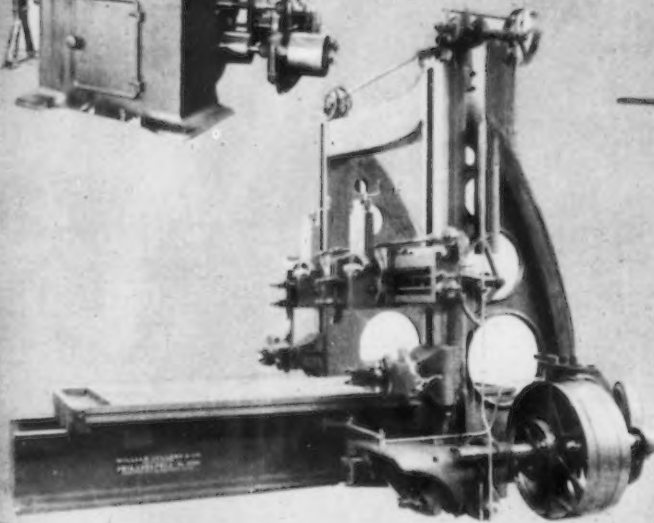
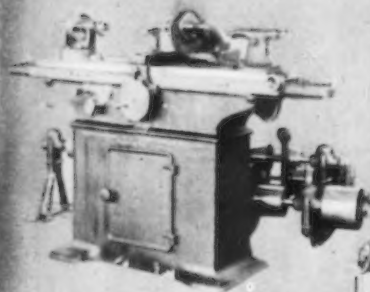
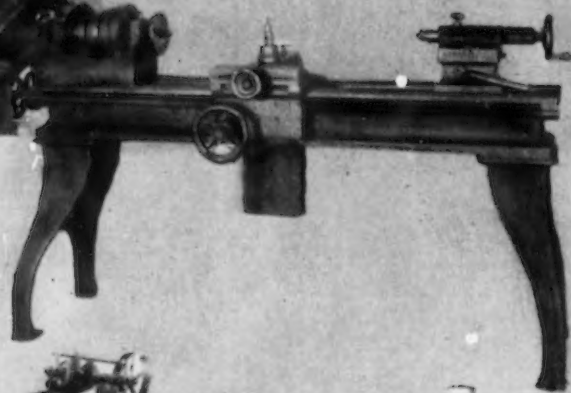
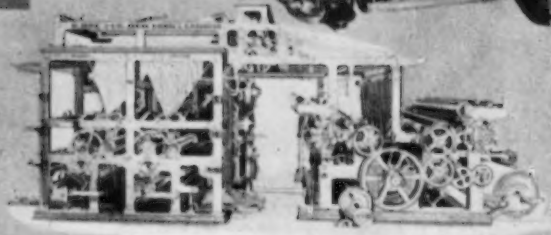
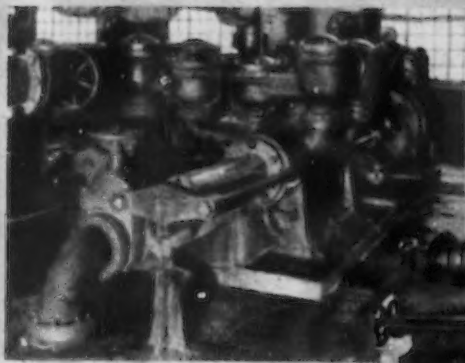
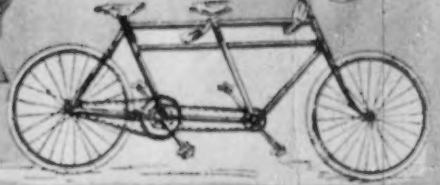
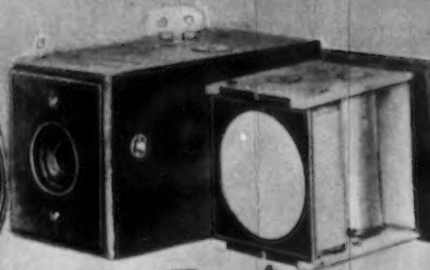
Analysis				Thickness in Inches	Yield Point, Lb. per Sq. In.	Tensile Strength, Lb. per Sq. In.	Elongation, Per Cent in 8 In.
C	Mn	Si	V				
0.15	1.40	0.20	0.13	1/2	59,800	87,200	24.00
0.15	1.40	0.20	0.13	3/4	63,600	92,600	20.00
0.16	1.43	0.22	0.10	1/2	65,000	89,600	22.75
0.16	1.43	0.22	0.10	3/4	61,700	93,600	20.00
0.15	1.40	0.20	0.13	7/8	62,600	92,000	24.25
0.16	1.43	0.22	0.10	7/8	64,600	92,000	23.50

TABLE IV
Chemical and Physical Properties of Cromansil Steel Plates

Analysis						Thick- ness in Inches	Yield Point Lb. per Sq. In.	Tensile Strength Lb. per Sq. In.	Elongation Per Cent in 8 In.
C	Mn	P	S	Si	Cr				
0.12	1.12	0.030	0.017	0.55	0.54	1/4	60,000	80,400	25.00
0.12	1.12	0.030	0.017	0.55	0.54	3/4	47,100	76,300	27.00
0.14	1.26	0.035	0.022	0.77	0.47	1	55,600	80,200	26.50
0.21	1.17	0.014	0.024	0.72	0.47	2	53,200	85,600	20.00
0.14	1.24	0.010	0.018	0.76	0.47	3	45,600	77,400	21.25
0.20	1.28	0.027	0.018	0.73	0.52	1 1/2	54,000	88,200	22.75



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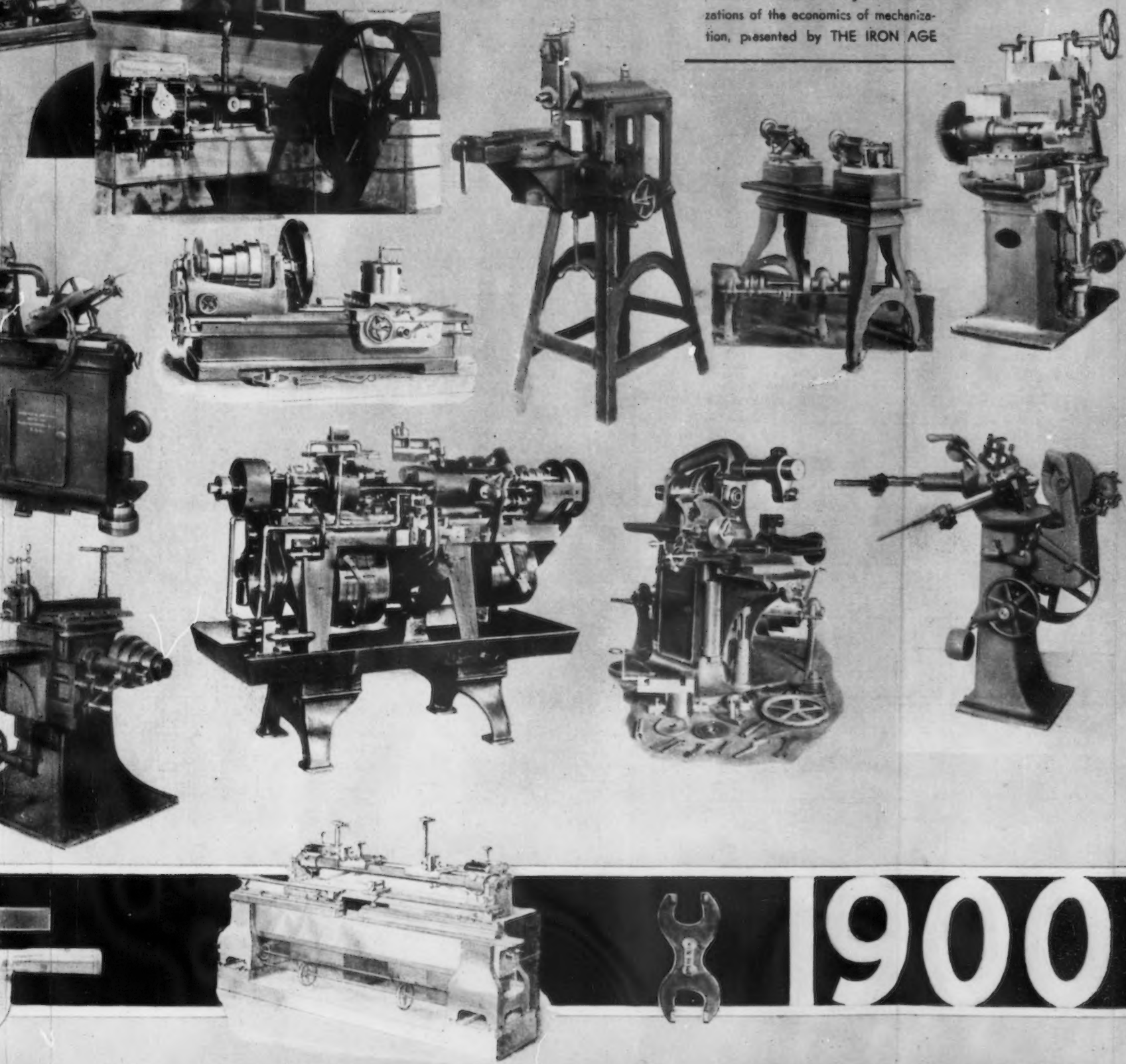


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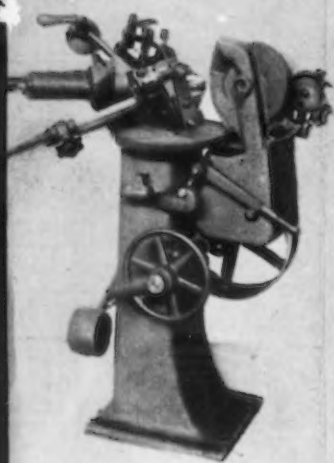
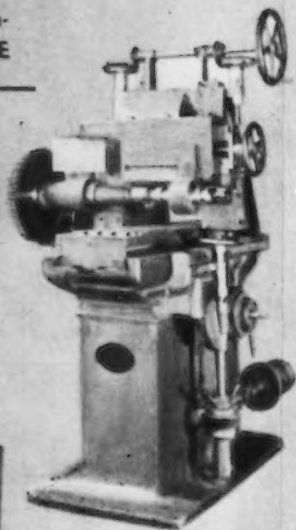
Third of a series of rotogravure visualizations of the economics of mechanization, presented by THE IRON AGE



1900

AND CONCO

usuali-
aniza-
PAGE



THE aphorism "divide and conquer" is a lenient political or military precept. The injunction contains the secret of progress. Industrial chemistry did not precede science split the molecule. The world became two worlds. And faster yet became three worlds. The atom.

In the physical and mechanical world, the aphorism holds true. Mechanical progress has seemed, seemingly, to man's ability to divide the inch, at low cost, has been the key to many and useful products.

Precision, itself, is not new. Man has divided the thousandth" nearly a century ago. The grinding of surface plates. But this was not the rule. It was high-cost precision. The application of extreme skill and the result was of laborious handwork. It was a costly product and out of reach of the masses.

As you view the suggestive illustrations on these pages, you will note the trend toward useful products that has resulted from the mastery of the splitting of the inch. The vision of commercial limits has been made attainable but profitable and useful. The hundredth of an inch of a century ago has become the thousandth and the thousandth has become the millionth.

00

CONQUER

"divide and conquer" is not merely excellent military procedure. In addition, this is the secret of material progress.

Man did not do more than creep until the machine. That "division" conquered new territory and became the pace when science split

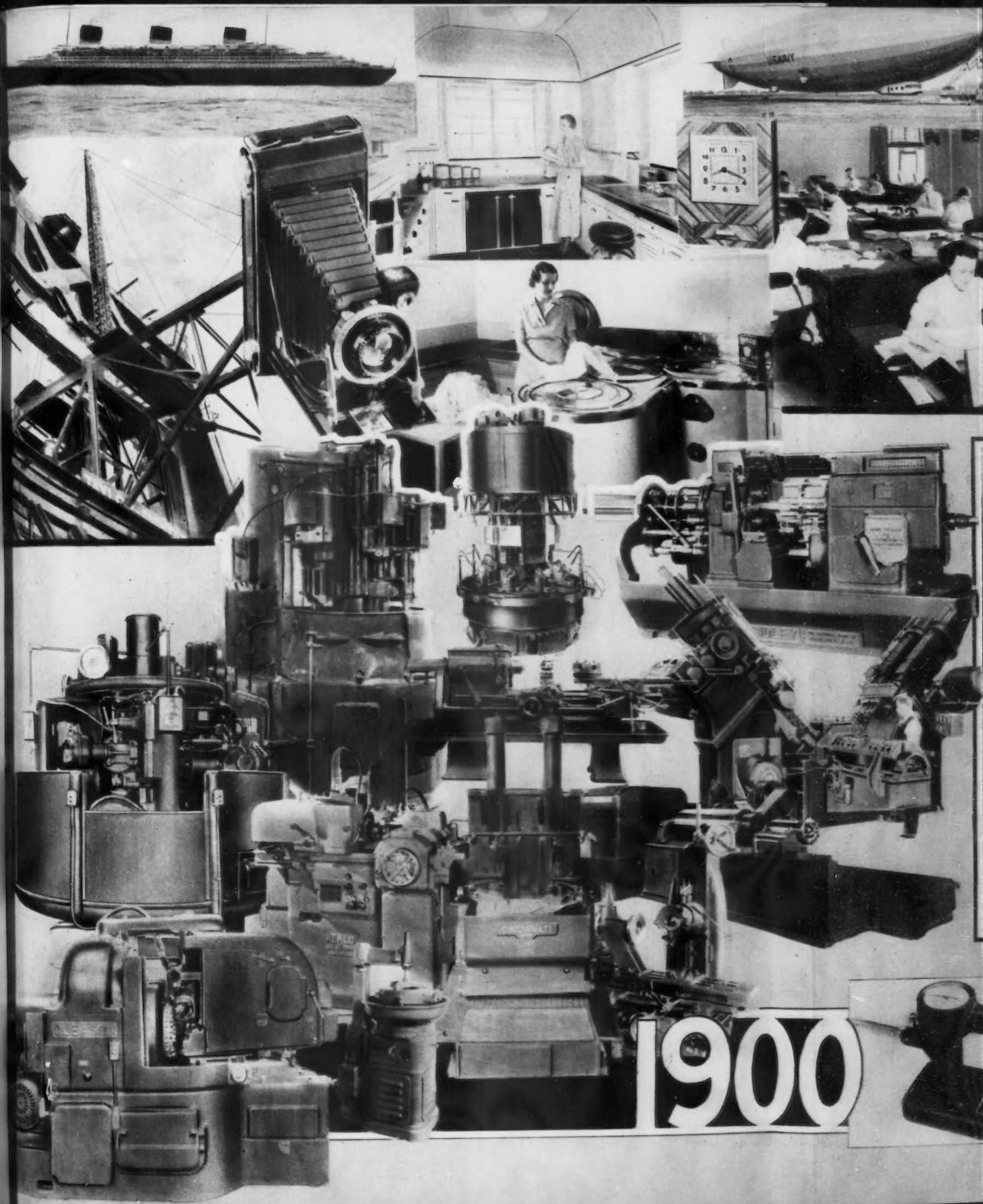
the physical and mechanical worlds the same thing. Mechanical progress has been in proportion to the ability to divide the inch. Fine division of the inch has been the greatest liberator of new

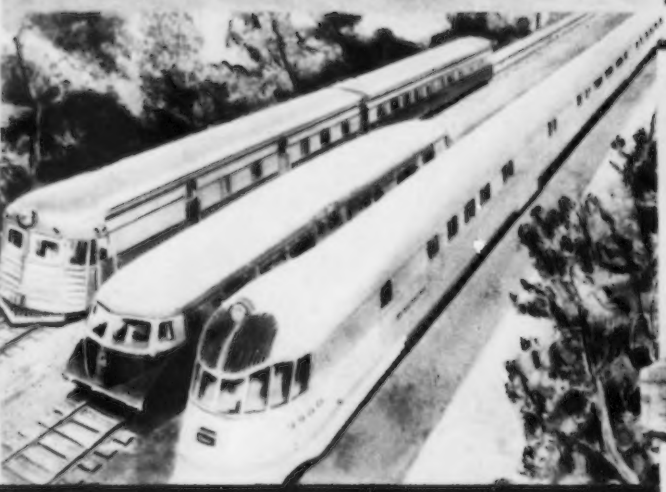
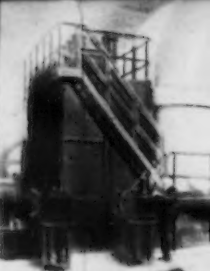
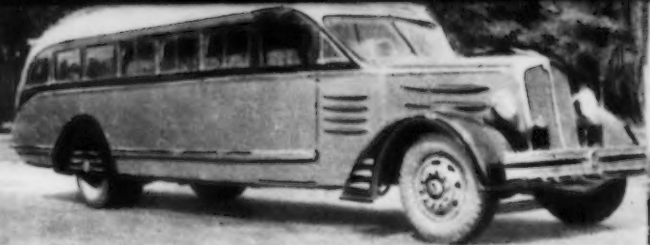
things not new. Maudslay undoubtedly "split the inch" a century and a half ago, in the making of the first machine.

But this precision was the exception, not the rule. High-cost precision, attained through the skill of the craftsman and at the expense of long hours of work. It was a "curiosity," not a commercial proposition of reach of average incomes.

The suggestive panorama of precision on the part of man note the tremendous multiplication of the inch. It has resulted from the commercial application of the inch. Each successive subdivision of the inch has added a host of hitherto unobtainable and useful products, as the hundredth of an inch a century ago became the thousandth of an inch and has become the tenth.





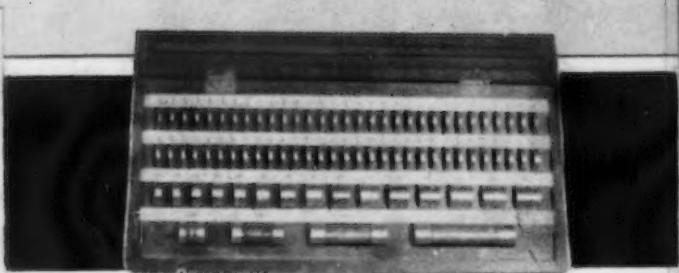



With this continuous struggle for the mastery of com-
finer and finer splitting of the inch has been an equally
means of obtaining and controlling it. As the scroll of t
grinding to supplement the work of the older master tool
of broaching and honing as commercial processes in the m
trend toward automaticity and the transfer of accuracy to
production and in size control.

Paralleling the evolution of means has been t
calipers and working models of the early days s
the micrometer and vernier and measuring mach
velous means of size inspection enable us to qui
though this is still, in most cases, beyond commer

What is back of this ceaseless urge, in
splitting" in the sense of reaching beyond
industry. The urge is there and will rem
commercial precision opens the door to
profits.

This, we believe, provides one c
sion has kept and will keep stea
himself to lag behind its processio



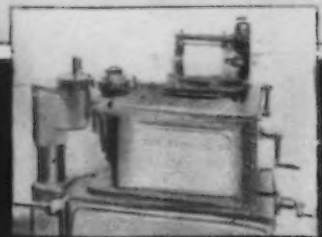
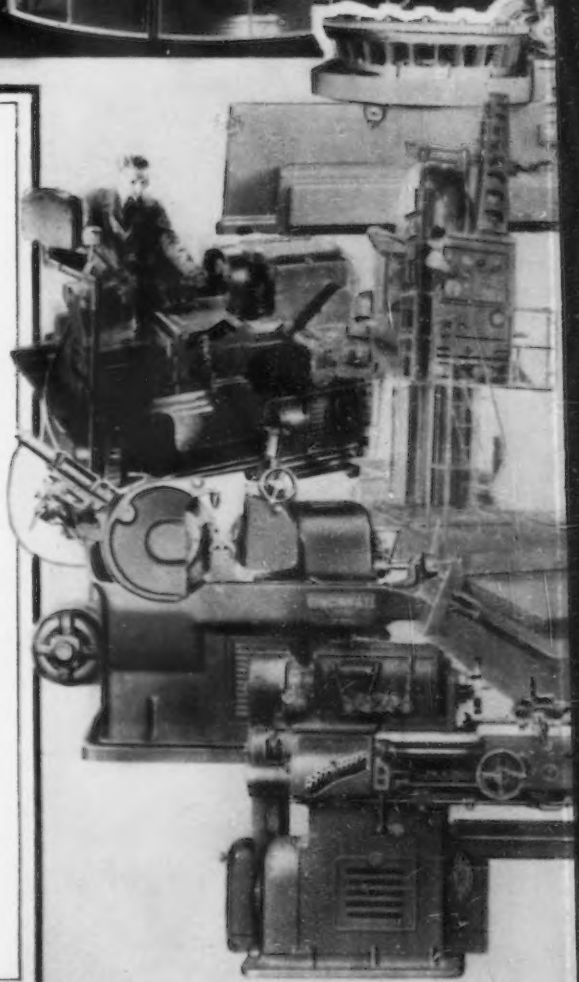


ery of commercial precision and new markets through the
an equally continuous evolution and improvement in the
e scroll of time unrolls, we see the coming of milling and
master tools of turning and planing; later the introduction
ses in the metal-working industry. Later still, we see the
accuracy to the machine itself taking definite form both in

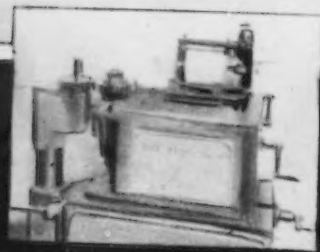
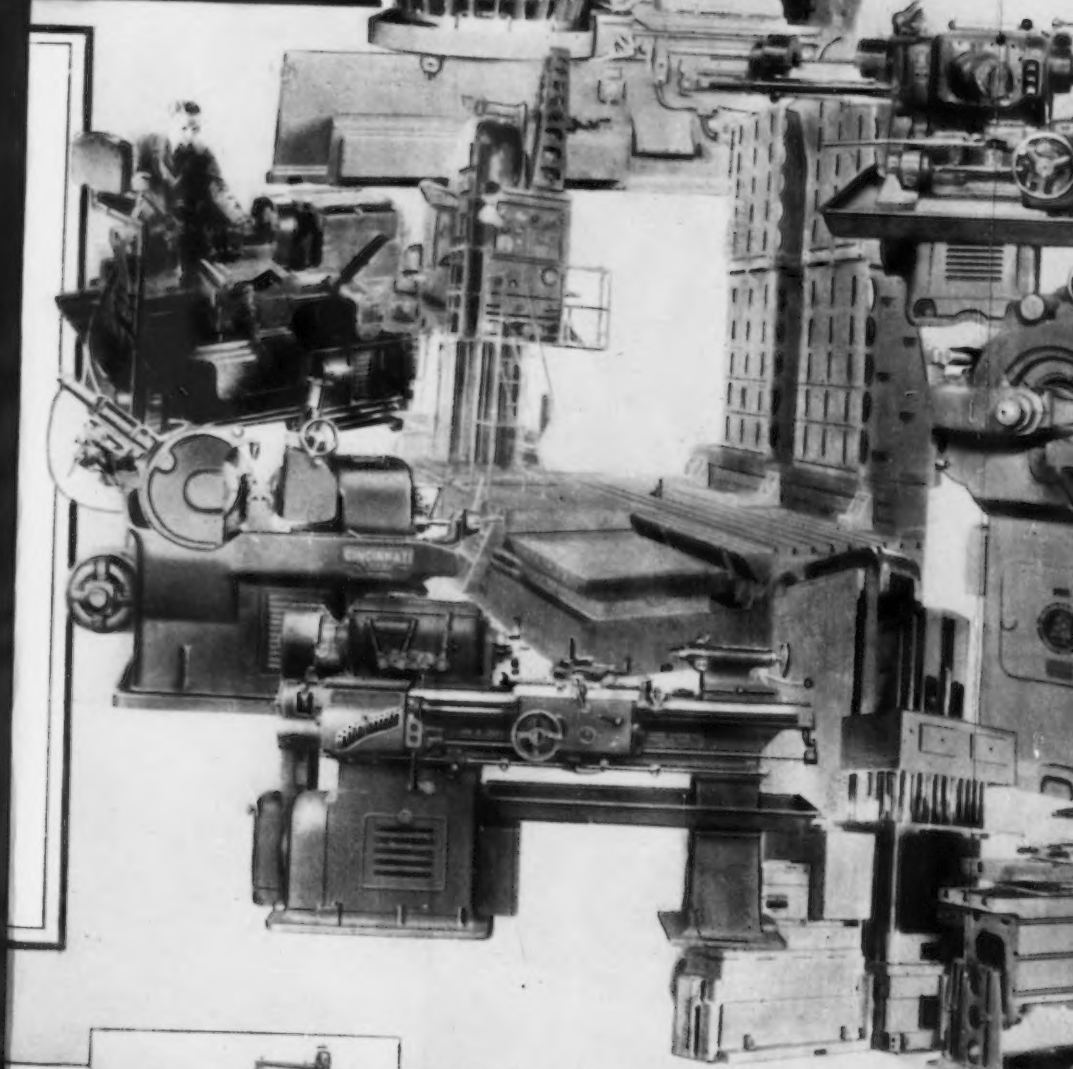
has been the evolution of control. The box rule and home-made
rly days sufficed for the obtainment of the hundredth or better.
aring machine gave us mastery of the thousandth; today our mar-
us to quickly probe the hundred thousandth of an inch, even
nd commercial manufacturing attainment.

ss urge, in our industry, for the further mastery of precision? Is it "hair
ing beyond the limits of common needs? No, indeed, for this is a practical
d will remain with us because men have learned that each forward step in
e door to new and enlarged markets; to new and better products and

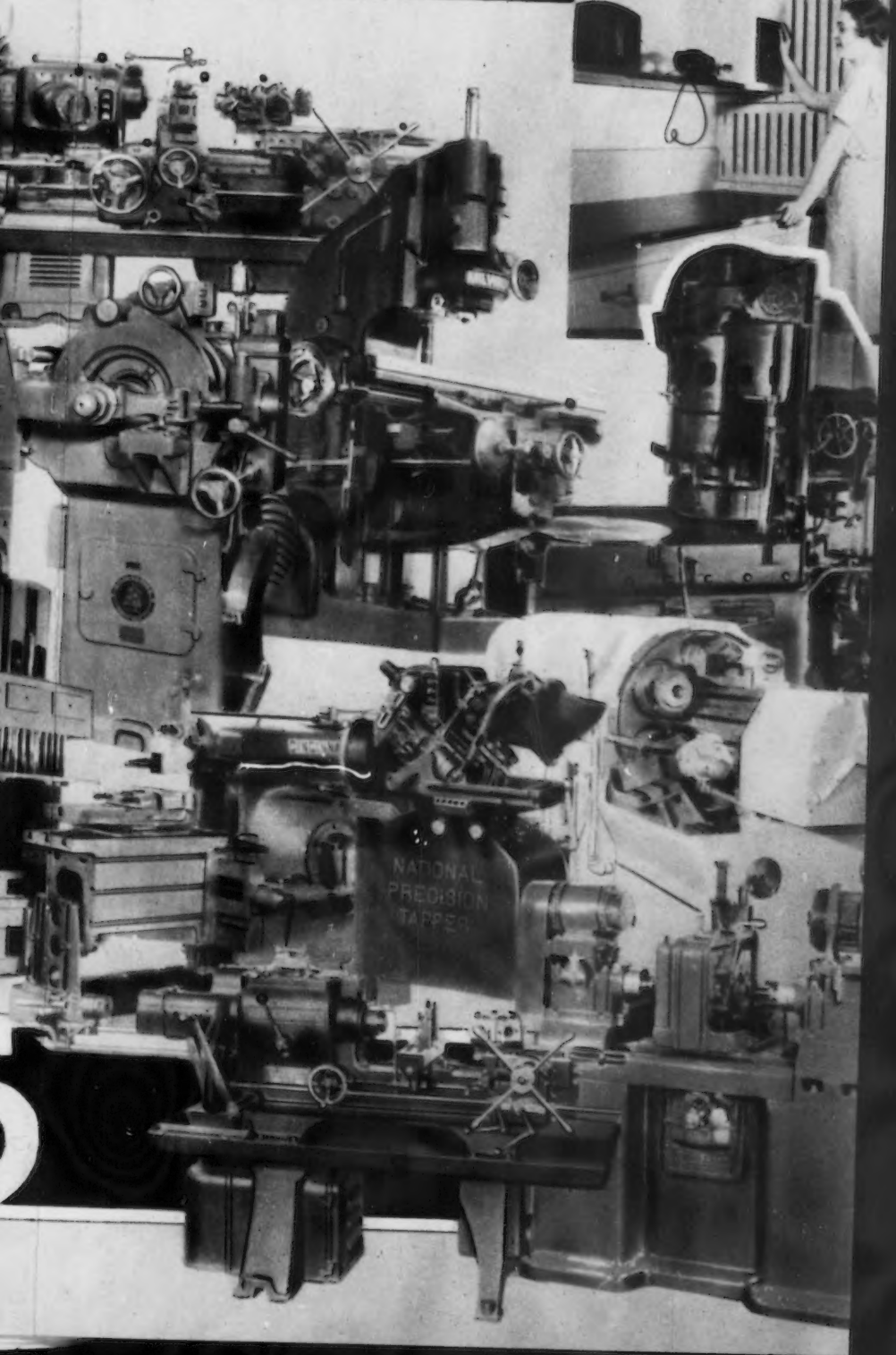
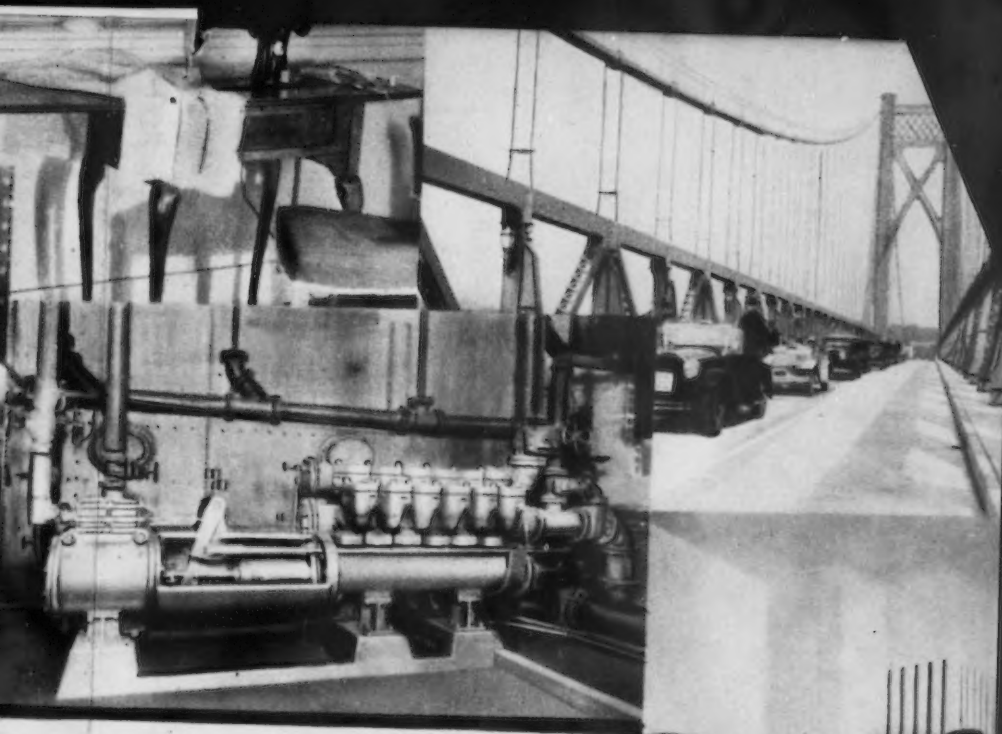
vides one of the strongest reasons for the practice of modernization. For preci-
keep steadily marching on, and the progressive manufacturer will not allow
s procession.



15

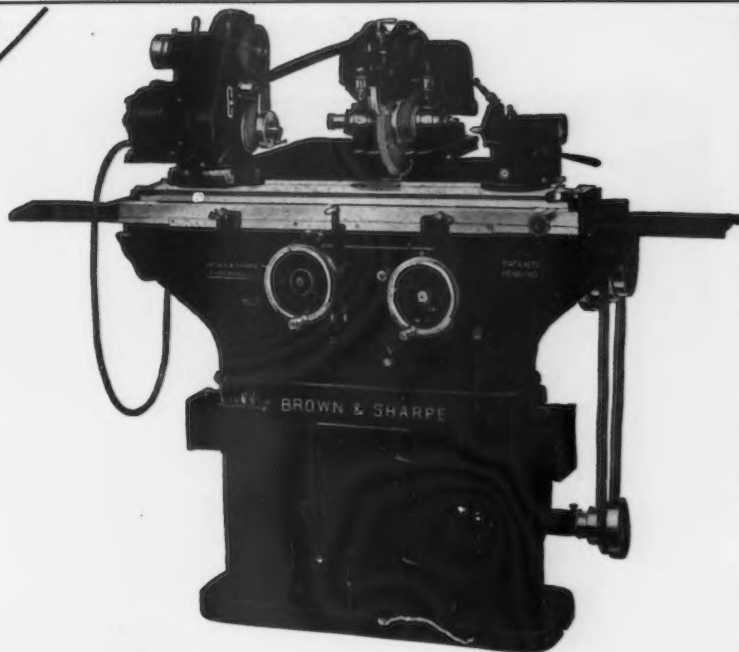


1935





Nos. 1, 2, 3 & 4
 . . . FOUR VERSATILE
 SELF-CONTAINED UNITS FOR
 TOOL WORK and MANUFACTURING



—the Increasingly Popular

BROWN & SHARPE

MOTOR DRIVEN UNIVERSAL GRINDING MACHINES

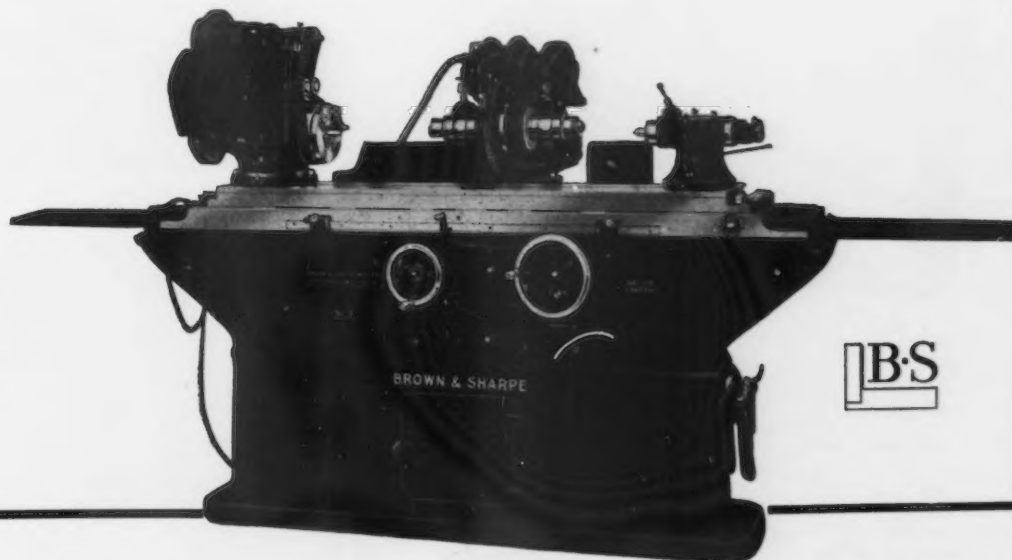
Compact . . . Convenient . . . Accurate

—with Individual Headstock Drive for work on live or dead centers — Tool and Cutter grinding — Internal grinding — Production grinding.

May we send details and explain the possibilities of these "truly universal" cost-cutting machines?

—Belt Driven machines can be furnished in corresponding sizes where countershaft drive is wanted.

Details on Request



Capacities—

	No. 1	No. 2	No. 3	No. 4
Diameter Centers Swing	10"	12"	12"	12"
Length Centers Take	20"	30"	40"	60"

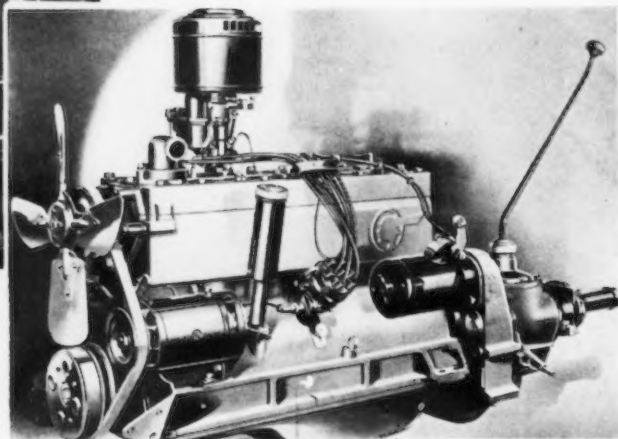
Brown & Sharpe Mfg. Co.
 Providence, R. I.
 U. S. A.

DIVIDE AND CONQUER



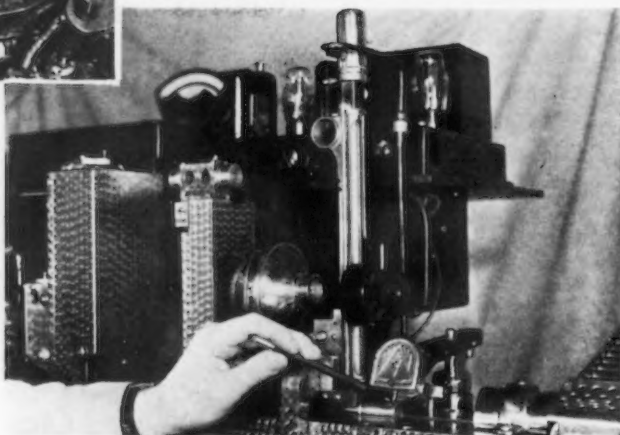
AT LEFT AND BELOW

WHAT part of an automobile requires the greatest precision? Pontiac Motor Co. tells us it is the motor wrist pin, held to a limit of 0.0001 in., both for taper and round. And the master wrist pins, used for checking purposes, are held to plus or minus two one hundred thousandth part of an inch.



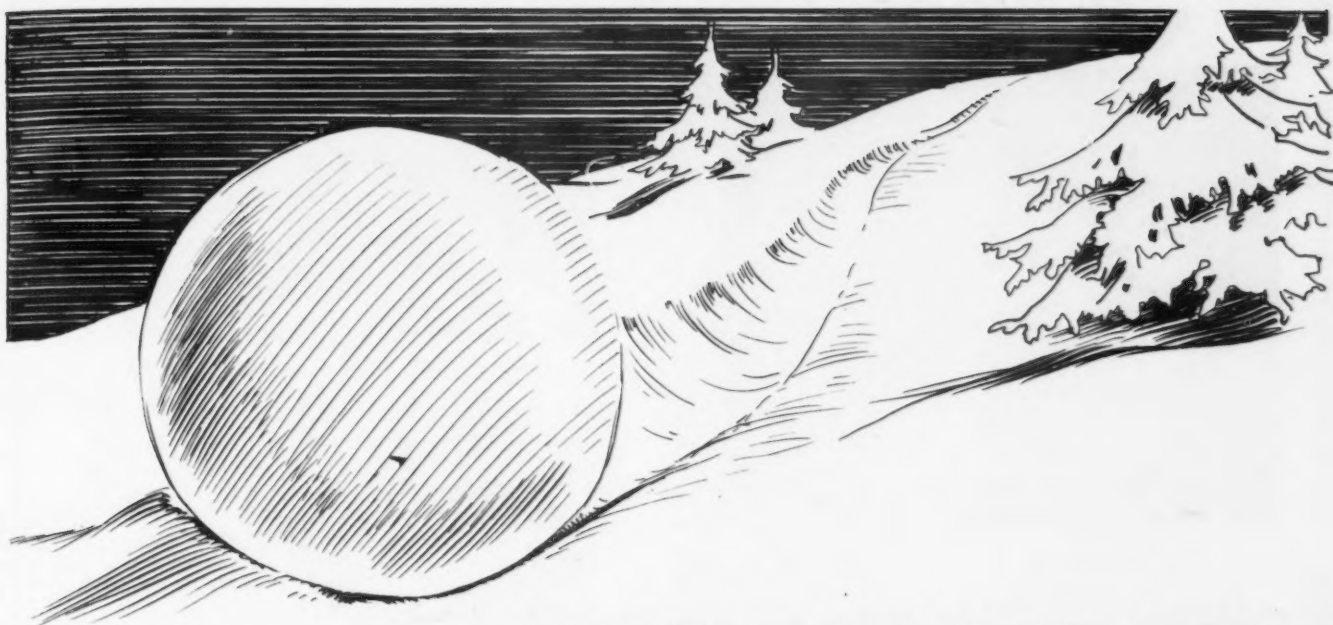
ABOVE AND AT RIGHT

PISTON pin bushings of the Ford V-8 are diamond bored and are held to a variation of not more than two ten thousandths of an inch. Diamond boring is shown above. At the right is a radio piston pin tester which tests Ford pins for roundness, smoothness, hardness, taper and size and which "hollers" when things are not just so.



ABOVE

IN rotating parts, precision in balance must be obtained. The chucking device of this Gisholt automobile clutch static balancing machine must be made accurate to a limit of one ten-thousandth of an inch in order to properly test the balance of automotive clutch assemblies.



SNOW BALLING YOUR PROFITS

First profits from the new Cincinnati All Steel Shear come from high return on investment—the dividends from quick and easy shearing. Maintenance charges for machine and knives go to reserve not to upkeep.

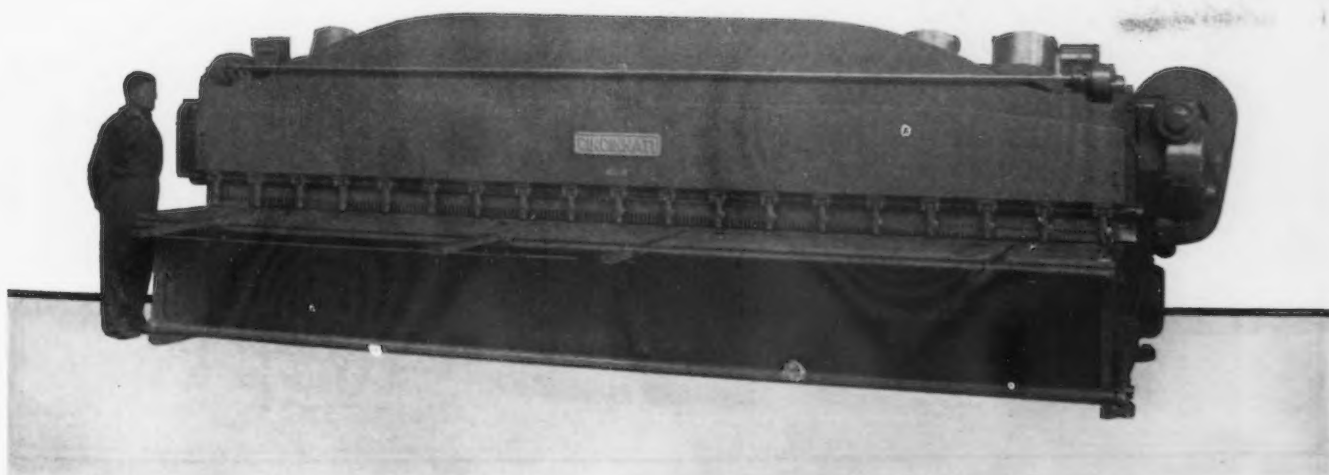
Then, time is saved beyond the seconds required to cut a sheet. You resquare on the first cut.

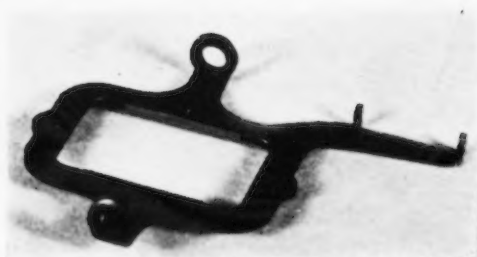
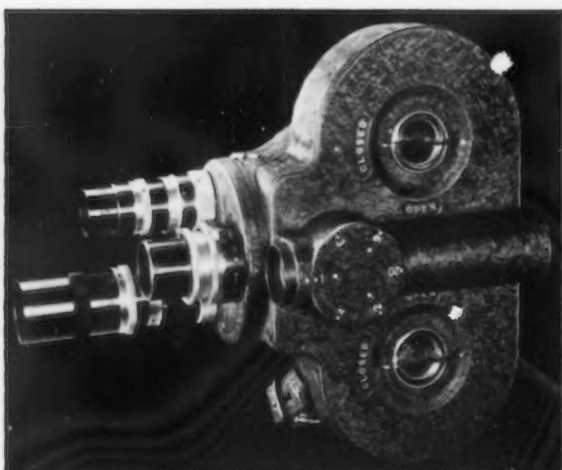
But profits go on and on—it's the quality product, whether sold or used, that yields the greatest income. The precision of this Shear is reflected in its output; rolling up your profits by lower fabricating costs, less waste, reliable products, and finally by repeat orders—the real source of profit.

Precision today is essential for profits. The Cincinnati is a precision Shear.

Cincinnati All Steel Shear
for 3/16" by 18'0"

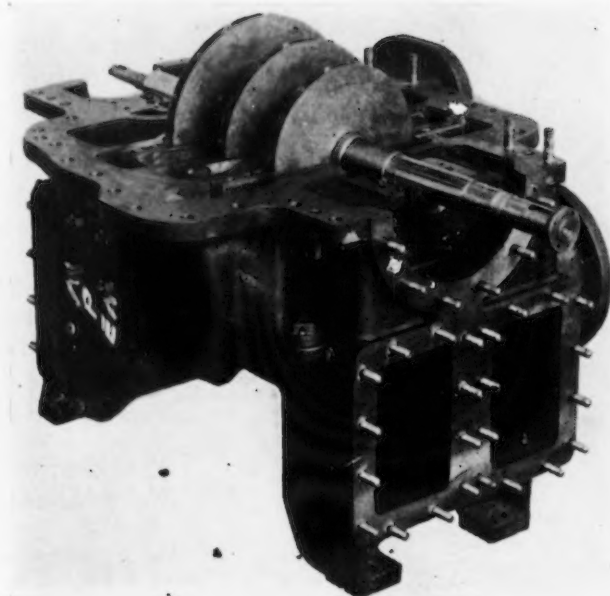
THE CINCINNATI SHAPER CO.
Cincinnati, Ohio





ABOVE AND UPPER RIGHT

IN the Bell and Howell motion picture projector, the most accurately finished part is the shuttle cam shaft, shown at top right. Shaft diameter and cam dimensions are held to half a thousandth. In the camera itself, the shuttle, shown below the cam shaft, is the part of greatest precision. Two tenths, three tenths and five tenths are the limits on various parts of this mechanism.



ABOVE

IN the Carrier centrifugal refrigerating machine, the thrust face is held to one-half of one ten thousandth of an inch in plane and the seal faces are lapped to a similar degree of accuracy.

ABOVE AND AT RIGHT

BALLS and sockets for Union Special Machine Co.'s sewing machines are matched to one tenth of a thousandth by selective inspection. Final inspection is by binoculars and a dial indicator.



DISCS

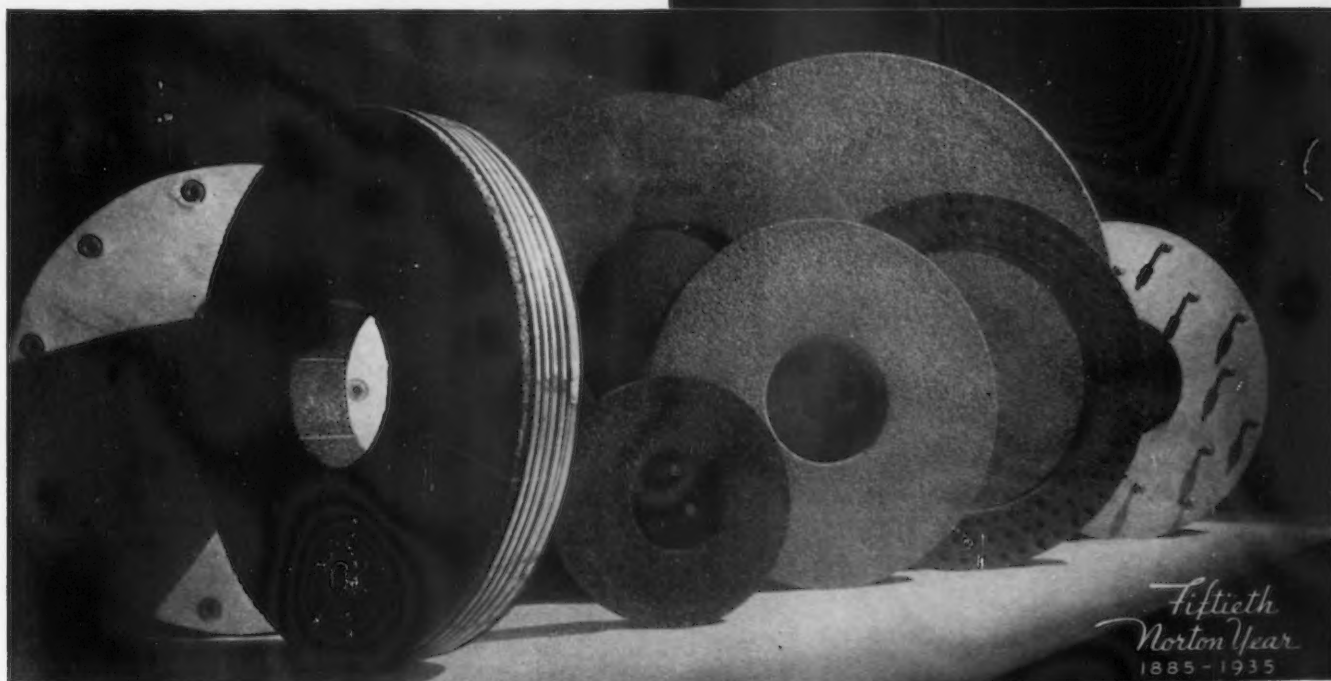
DISCS

DISCS

for All Kinds of Surfacing

WHETHER you want thick discs for rough, off-hand surfacing or for high quality, high production work you can find them in the Norton line. They are available in solid and segmental vitrified, solid and segmental Bakelite, solid silicate and solid shellac. Norton Discs of the solid type are available in both inserted nut and plate mountings and the segmental type in the inserted nut only.

All Norton Discs are made by the patented Controlled Structure process—the Norton development that makes it possible to fit grinding action more accurately to the particular requirements of any job. And the more accurately grinding action is fitted to a job the lower grinding costs will be. A trial of Norton Discs will quickly prove this.



*Fiftieth
Norton Year*
1885-1935

NORTON COMPANY, WORCESTER, MASS.

New York Chicago Detroit Philadelphia Pittsburgh
Hartford Cleveland Hamilton, Ont. London Paris
Wesseling, Germany

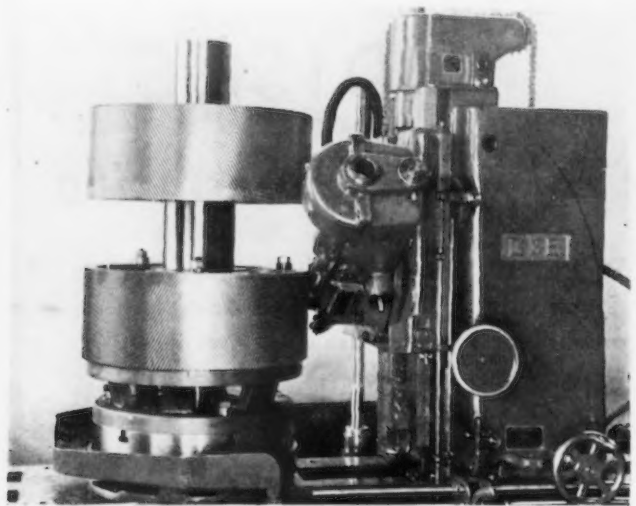
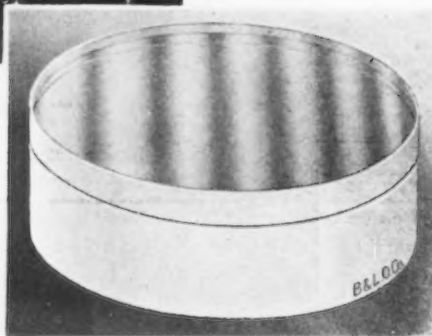


DIVIDE AND CONQUER



ABOVE

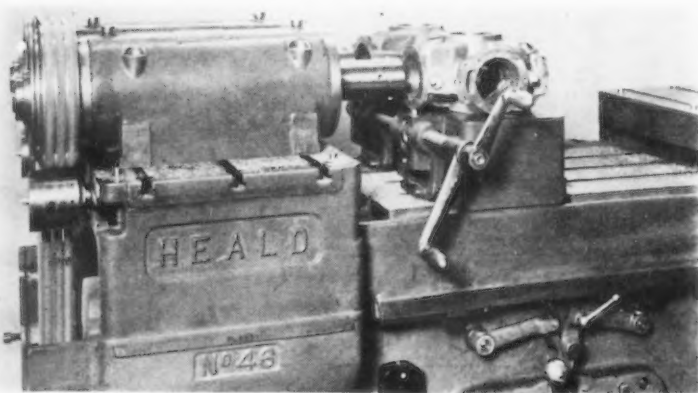
IN the making of precision instruments, Bausch and Lomb lean heavily upon the light wave method of measurement, which gives them control of surface dimensions to the ten millionth part of an inch or less.



ABOVE

THESE high speed turbine reduction gears were cut by Gould & Eberhardt to extreme accuracy, to operate smoothly at 7000 ft. per min. The tooth forms were held to two and one half ten thousandths and the tooth spacing error to two tenths of one thousandth.

o o o

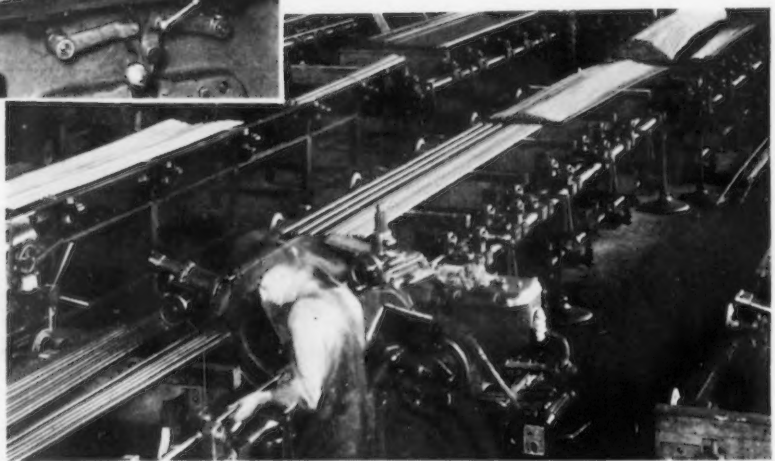


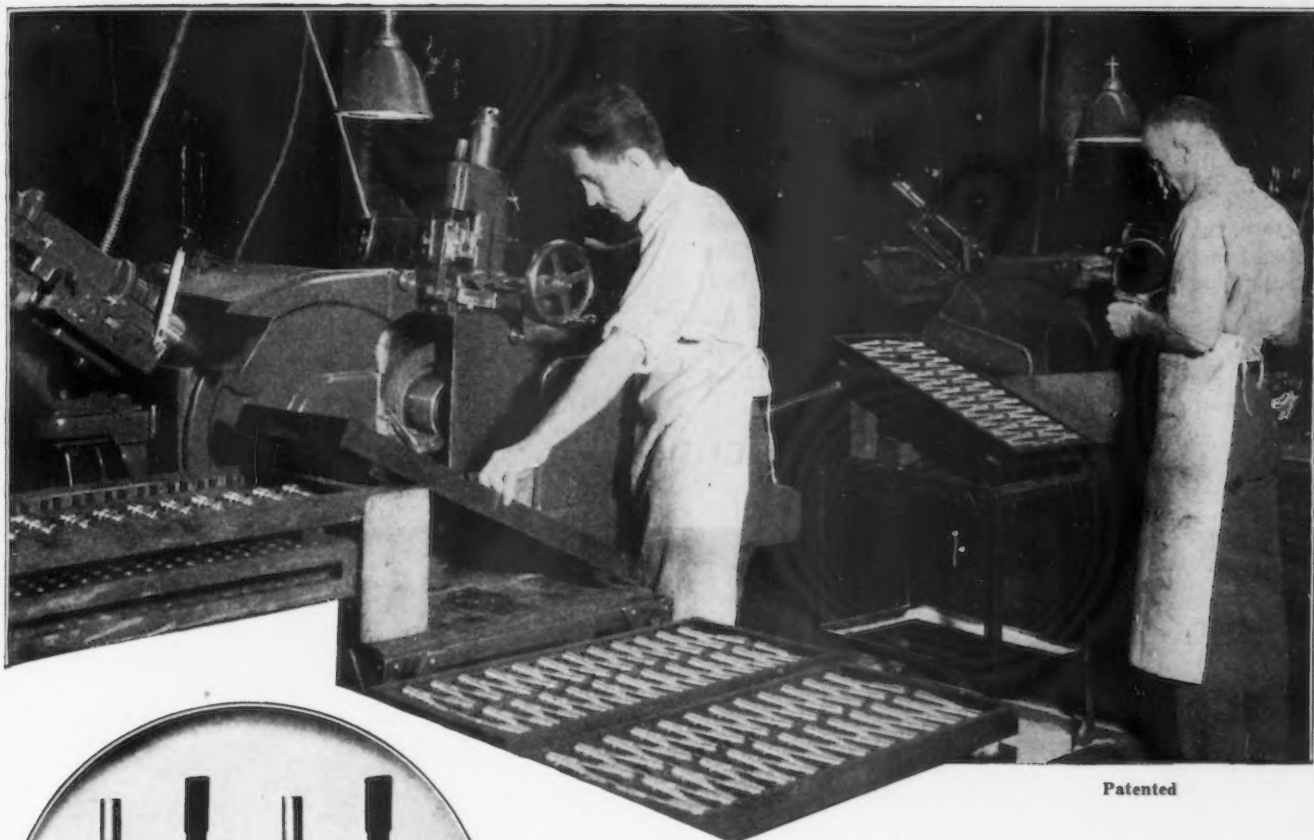
ABOVE

STATE laws prescribe that when you buy five gallons of gasoline, there cannot be more than 2 cu. in. allowance either way. This means that pump meter bodies or cylinders must be bored to the half thousandth or better, as is being done on this Heald set-up.

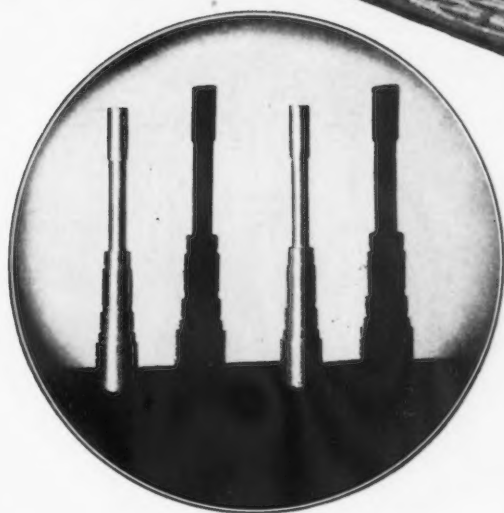
BELOW

STEEL rounds are ground on Cincinnati centerless grinders to close tolerances by the Union Drawn Steel Co. While standard tolerances range according to size, from two to three thousandths, special requirements are met with limits up to a quarter thousandth in diameter.





Patented



WHY CENTERLESS WAS SELECTED!

- Complete grinding cost 10% of former cost.
- Spoilage reduced — 95 pieces in 40,000.
- Tolerance for size—.0005 in.
- Concentricity perfect.
- Elimination of centers.
- Five diameters ground at one time.



10 FOR COST OF 1...

That's it exactly! Cincinnati Centerless method *cuts precision grinding costs of distributor shafts 90%*. Now—the user grinds 10 for the cost of 1.

Two Cincinnati No. 2 Centerless Grinders rough and finish grind five diameters perfectly concentric. One cut is taken on each machine by the infeed method. Average stock removal; .009 in., roughing — .002 in., finishing — *with limits $\pm .0005$ in. maintained.* Here is performance that justified the purchase of the Centerless Grinders.

Accurate and profitable results obtained on this job are characteristic of Cincinnati Centerless Grinders. Your investment in a Centerless Grinder should bring you profits. Determine today . . . to make an investment analysis . . . to replace wherever it will mean more profits.

Cincinnati Grinders Incorporated
Cincinnati, Ohio, U.S.A.

For "All Round" INTERNAL GRINDING

WHILE a large number of our machines are sold for production work and therefore automatic equipment is selected, yet there are many shops and tool rooms with miscellaneous work and varied size lots that are buying the Plain Style No. 72A which is ideal for their requirements.

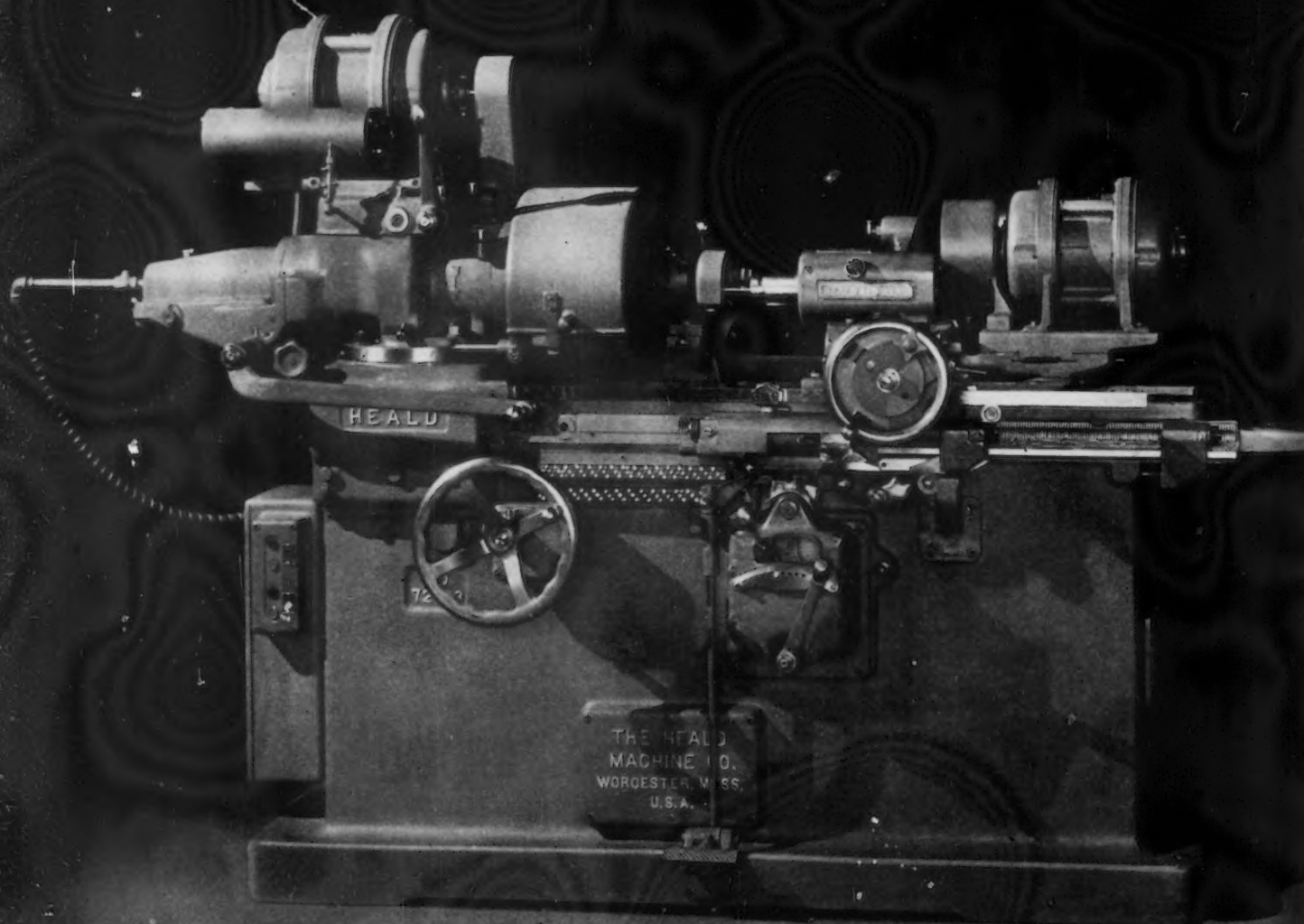
This machine can be readily arranged with various fixtures, grinds straight or taper, and can be equipped with cross slide workhead, raising blocks, center rest, facing attachment and other units.

The Plain No. 72A is equipped with a hydraulic drive for the table which is especially desirable for miscellaneous work as it gives any speed desired and can be stopped or reversed instantly at any point.

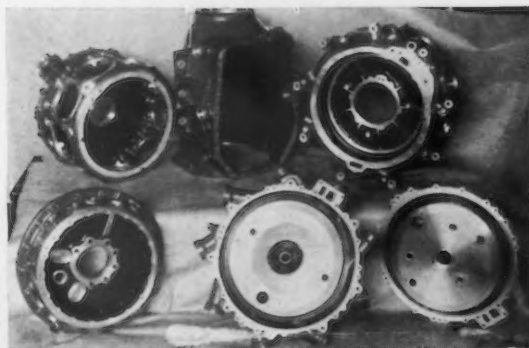
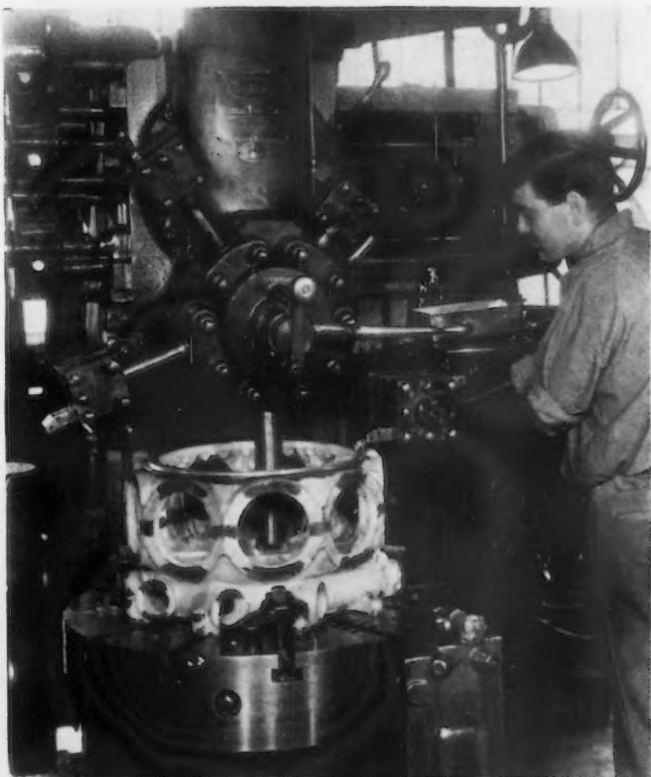
This machine, besides being universal in the wide variety of work it will handle, has all the desirable operating features to make it fast and accurate.

New bulletin sent on request.

THE HEALD MACHINE CO., WORCESTER, MASS., U. S. A.



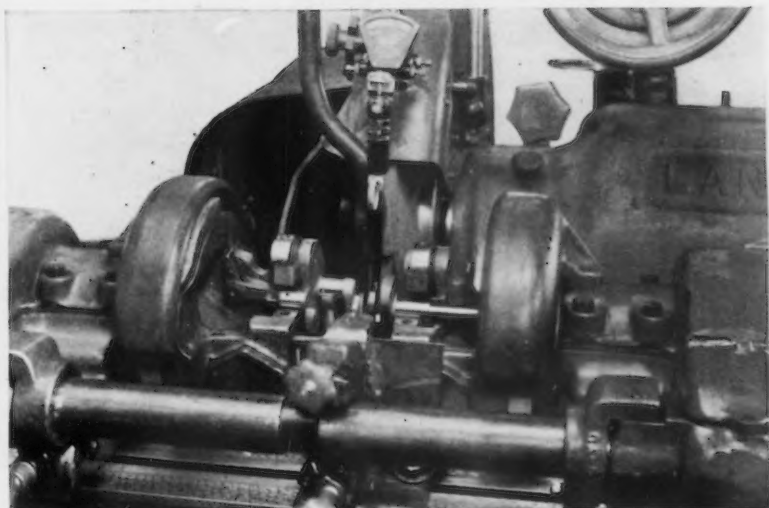
DIVIDE AND CONQUER



AT LEFT AND ABOVE

PRECISION is the watchword in the making of aircraft motor parts, where mishaps mean a matter of life or death. Here we see a Bullard Vertical Lathe working to the "quarter" on sizeable diameters and also some of the parts requiring similar accuracy.

o o o



AT LEFT

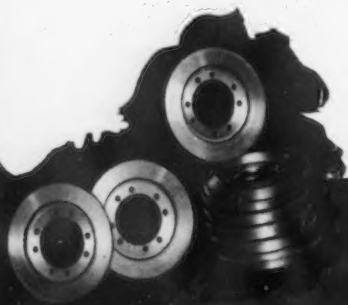
PRECISION has made the electric refrigerator possible, and low cost precision puts it within the average income's reach. Here we have the Landis Hydraulic Crank Pin Grinder, finishing refrigerator motor cranks to the half thousandth in diameter and to three ten thousandths in plane.

AT RIGHT

TIMKEN bearings for Warner & Swasey Turret Lathes are held to a precision limit of one ten thousandth part of an inch for run out. In the testing operation shown, the vernier below the microscope eyepiece reads to one one hundred thousandth of an inch.



BULLARD

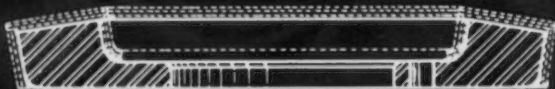


BULLARD

BULLARD VERTICAL AUTOMATIC LATHE

Single Chucking
Required

Forged Steel Crown Gear
8 1/4 inch Diameter



Operations --

Rough Face with Left
Universal Head.

Rough Turn with Right
Universal Head.

Rough Bore and Turn
with Center Head.

All Heads Cutting
Simultaneously.

Finish Face and Finish
Radius with Left Universal
Head.

Finish Turn and Finish
Bore with Right Universal
Head.

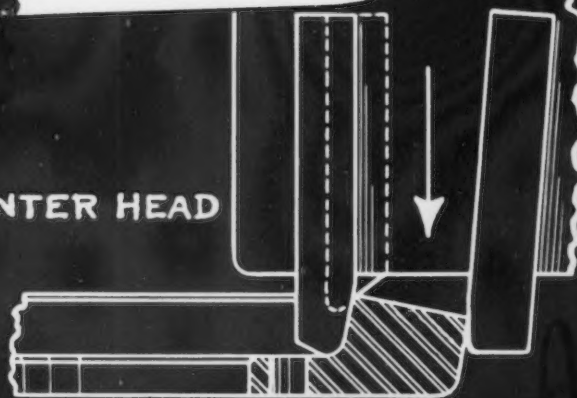
Heads Cutting Simultan-
eously.

Cutting Time

2 Min. 37 Sec.

Remove finished piece
on Reload. 30 Sec.

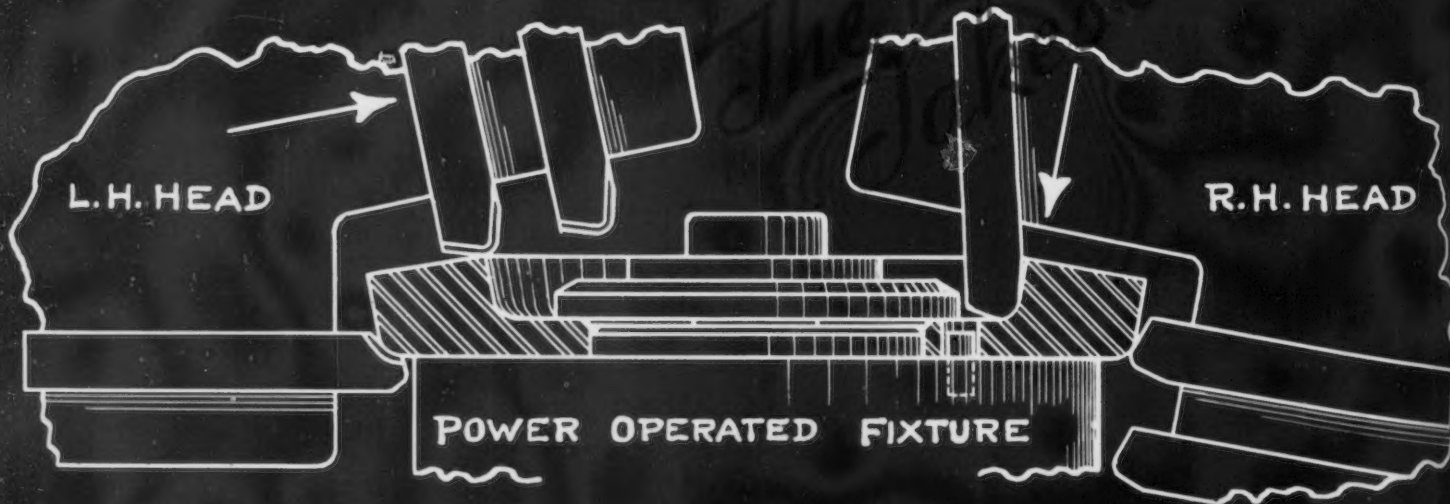
CENTER HEAD



L.H. HEAD

R.H. HEAD

POWER OPERATED FIXTURE

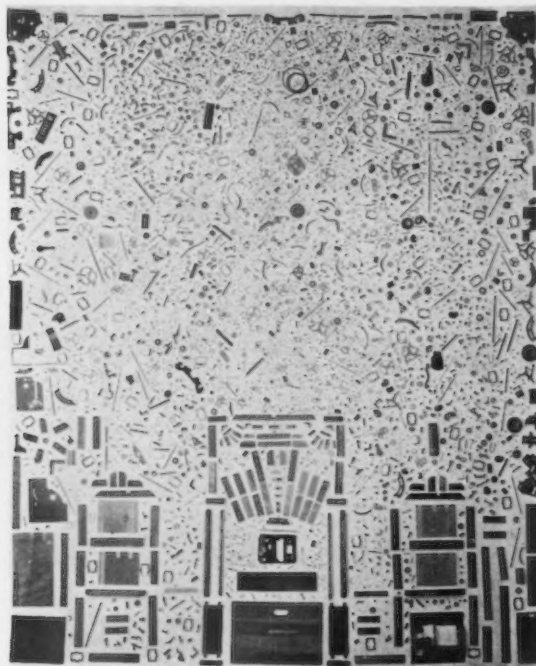
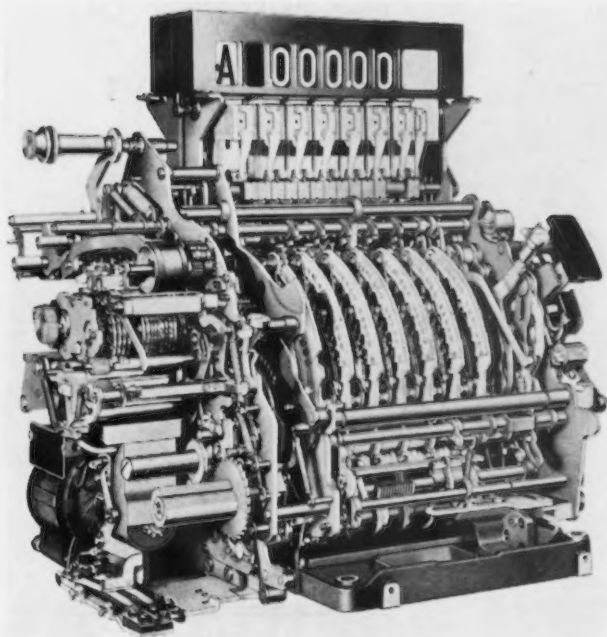


CROWN GEAR-FORGED STEEL MACHINED ON VERTICAL AUTOMATIC LATHE

THE BULLARD COMPANY

BRIDGEPORT, CONN.

DIVIDE AND CONQUER



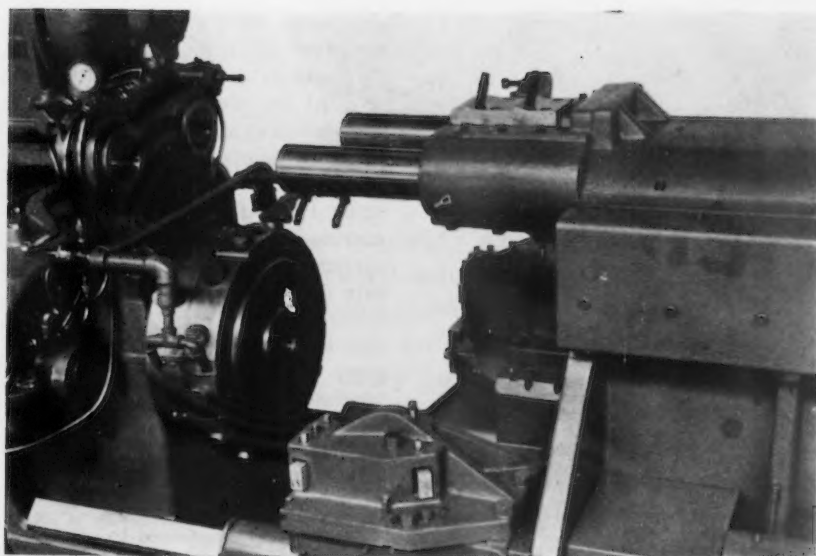
ABOVE

THREE hundred thousand operations are required to complete a typical National Cash Register. Think of the accuracy of tool and die making that is required before these myriad precise and minute parts can be produced and assembled.

o o o

BELOW

COMBUSTION chambers, valve guides, bores and valve seats on the Jacobs airplane motor are held to tolerances of one half thousandth in this Warner & Swasey turret lathe operation.



ABOVE

A TOLERANCE of five thousandths on a ring gear 24 in. in diameter is as difficult as the obtaining of a tenth of a thousandth on a small diameter. Distortion in chucking for the finishing cut on the Foster Fastermatic is avoided by automatically reducing the compensating chuck pressure for the final operation.



Effect of Heat Treatment on Corrosion-Resistance of Magnesium-Zinc and Magnesium-Aluminum Alloys

(CONTINUED FROM PAGE 11)

TABLE II

Effect of Tempering on the Corrosion Resistance of Magnesium-Zinc Alloys

Tempering Temperature in Deg. C.	Weight Decrease (Gm. per Sq. Cm.)				
	3 days	6 days	10 days	17 days	25 days
Alloy Zn 2 (2.05 per cent zinc)					
as quenched	0.0010	0.0018	0.0030	0.0065	0.0113
160	0.0014	0.0027	0.0046	0.0099	0.0186
230	0.0015	0.0029	0.0047	0.0096	0.0184
290	0.0015	0.0029	0.0049	0.0111	0.0189
350	0.0010	0.0024	0.0038	0.0096	0.0171
Alloy Zn 3 (3.06 per cent zinc)					
as quenched	0.0006	0.0014	0.0026	0.0062	0.0098
160	0.0012	0.0025	0.0045	0.0094	0.0154
230	0.0010	0.0023	0.0042	0.0099	0.0181
290	0.0008	0.0022	0.0040	0.0087	0.0143
350	0.0010	0.0024	0.0041	0.0094	0.0145
Alloy Zn 5 (5.08 per cent zinc)					
as quenched	0.0006	0.0017	0.0034	0.0074	0.0120
160	0.0017	0.0035	0.0063	0.0128	0.0194
230	0.0021	0.0044	0.0086	0.0194	0.0300
290	0.0010	0.0026	0.0050	0.0099	0.0151
350	0.0012	0.0029	0.0055	0.0115	0.0180
Alloy Zn 6 (6.15 per cent zinc)					
as quenched	0.0008	0.0023	0.0046	0.0083	0.0128
160	0.0019	0.0040	0.0073	0.0134	0.0212
230	0.0056	0.0095	0.0156	0.0250	0.0383
290	0.0019	0.0038	0.0068	0.0119	0.0182
350	0.0024	0.0045	0.0078	0.0134	0.0208
Alloy Zn 7 (7.15 per cent zinc)					
as quenched	0.0006	0.0020	0.0041	0.0087	0.0138
160	0.0016	0.0049	0.0081	0.0162	0.0243
230	0.0050	0.0091	0.0150	0.0289	0.0456
290	0.0019	0.0042	0.0068	0.0134	0.0215
350	0.0024	0.0045	0.0077	0.0149	0.0231

TABLE III

Effect of Annealing on Corrosion of Magnesium-Zinc Alloys

Designation of Specimen	Weight Decrease (Gm. per Sq. Cm.)					
	3 Days	6 Days	10 Days	17 Days	25 Days	
Zn 2 {	C	0.0012	0.0027	0.0043	0.0081	0.0133
	L	0.0023	0.0043	0.0060	0.0108	0.0181
	H	0.0016	0.0031	0.0048	0.0091	0.0152
Zn 3 {	C	0.0003	0.0010	0.0023	0.0046	0.0079
	L	0.0008	0.0019	0.0033	0.0062	0.0098
	H	0.0009	0.0019	0.0033	0.0061	0.0093
Zn 5 {	C	0.0004	0.0012	0.0025	0.0053	0.0090
	L	0.0007	0.0017	0.0031	0.0066	0.0106
	H	0.0013	0.0027	0.0049	0.0094	0.0157
Zn 7 {	C	0.0006	0.0019	0.0034	0.0070	0.0117
	L	0.0018	0.0037	0.0057	0.0105	0.0161
	H	0.0015	0.0030	0.0052	0.0106	0.0170

C=as cast, L=low-temperature annealed, H=high-temperature annealed.

cooled. Alloy Al 11 tempered at 160, 230, 300, 360, and 430 deg.; alloy Al 10 tempered at 160, 230, 300, 360, and 420 deg.; and alloys Al 8, Al 6, and Al 4 tempered at 160, 230, 300, 360, and 400 deg.

Annealing: The cast specimens were annealed at the following temperatures for 7 hr. and then furnace-cooled: High-temperature

annealed at 430, 420, 390, 350, and 350 deg. for specimens Al 11, Al 10, Al 8, Al 6, and Al 4 respectively; low-temperature annealed at 370, 350, 300, 180, and 180 deg., respectively.

Each of the specimens was immersed in 300 cc. of $\frac{N}{100}$ NaCl

solution, and the weight loss of each was measured after an elapse of 1, 2, 3, 4 and 5 days.

TABLE I

Composition of Magnesium-Zinc Alloys Tested

Designation of Specimen	Analysis Per Cent Zinc
Zn 7	7.15
Zn 6	6.15
Zn 5	5.08
Zn 3	3.06
Zn 2	2.05

The effect of tempering and quenching on the corrosion resistance of the specimens are shown in Table V. It may be seen that specimens Al 4 and Al 6 indicate no effect of tempering, but in alloys containing more than 7.82 per cent Al an effect is observable at temperatures above 230 deg. The effect of tempering on the corrosion of these alloys, however, is quite different from that of magnesium-zinc alloys; that is, tempering causes a decrease in the rate of attack. The fact that the specimens in which fine particles are separated by tempering are more resistant than the quenched specimens consisting of single phase is difficult to adequately ex-

TABLE IV

Analysis of Magnesium-Aluminum Alloys Tested

Designation of Specimen	Aluminum Content, Per Cent
Al 11	10.78
Al 10	9.84
Al 8	7.82
Al 6	5.72
Al 4	3.85

plain by the electrochemical theory.

An examination of the microstructure of the quenched 9.84 per cent Al alloy shows that it consists of a single phase. A microphoto of the same specimens tempered at 160 deg. shows the second phase separated along the crystal boundaries in a form similar to the troostite in steel. Tempered at 230

(CONTINUED ON PAGE 48)

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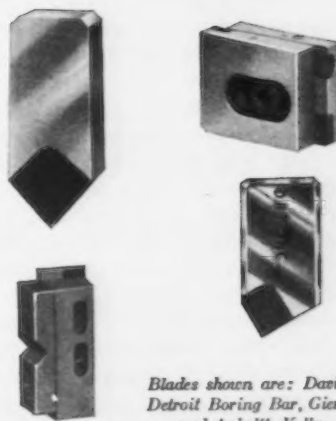
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(CONTINUED FROM PAGE 46)

deg. results in a development of this troostite structure on the whole surface of the grain. An examination of the specimen tempered at 300 and 360 deg., respectively, shows that a separation and aggregation of the compound has occurred with the rise of heating temperature and, moreover, the compound separated from a crystal grain appears to lie in the same direction. This would indicate that the compound is separated along the cleavage plane. The structure of the specimen tempered at 420 deg. shows the pearlite-like structure of steel. As the temperature 420 deg. is the range of single solid solution for this specimen, the pearlite-like structure should be formed by rapid separation from the super-cooled condition during cooling.

Results Similar to Phenomenon of Weight Loss in HNO_3

When these structures were compared with the results of the corrosion tests, it was perceived that the specimens having troostitic and pearlitic structures were less corrosive than quenched ones. These results are similar to the phenomenon that the weight loss in a HNO_3 solution of cast iron with heterogeneous structure is less than that of pure iron with homogeneous structure, and hence this fact may be explained by anodic oxidation as follows:

The corrosion of the specimen showing troostitic structure rapidly progresses after immersion in the solution by galvanic action through the numerous number of local cells formed by the separated fine particles; in this initial stage of corrosion, therefore, a greater rate of attack would result in the tempered specimens than in the quenched ones. The positive parts of numerous local cells are, however, anodically oxidized in a short while, and the result is similar to that of the whole surface being covered with an oxide or hydroxide film. Thus a considerable decrease in the rate of attack is observed.

Two kinds of corrosion products of these specimens may be named, namely, white precipitate which is gelatinous matter taking an appreciable time to settle and black flakes which adheres to the surface of specimen. A chemical analysis indicates that the white substance

(CONTINUED ON PAGE 50)

TABLE V
Corrosion Data for Quenched and Tempered Magnesium-Aluminum Alloys

Tempering Temperature in Deg. C.	Weight Decrease (Gm. per Sq. Cm.)				
	1 Day	2 Days	3 Days	4 Days	5 Days
Alloy Al 4 (3.85 per cent aluminum)					
as quenched	0.0125	0.0500	0.0865	0.1196	0.1466
160	0.0115	0.0461	0.0832	0.1147	0.1415
230	0.0105	0.0443	0.0788	0.1100	0.1357
300	0.0116	0.0452	0.0809	0.1119	0.1378
360	0.0115	0.0448	0.0798	0.1105	0.1353
400	0.0115	0.0436	0.0784	0.1078	0.1335
Alloy Al 6 (5.72 per cent aluminum)					
as quenched	0.0098	0.0362	0.0643	0.0913	0.1150
160	0.0086	0.0325	0.0605	0.0864	0.1090
230	0.0084	0.0319	0.0587	0.0837	0.1054
300	0.0092	0.0332	0.0609	0.0857	0.1078
360	0.0087	0.0317	0.0583	0.0827	0.1029
400	0.0089	0.0338	0.0613	0.0860	0.1079
Alloy Al 8 (7.82 per cent aluminum)					
as quenched	0.0107	0.0468	0.0836	0.1161	0.1425
160	0.0099	0.0443	0.0816	0.1123	0.1385
230	0.0107	0.0406	0.0703	0.0980	0.1210
300	0.0094	0.0366	0.0668	0.0941	0.1166
360	0.0087	0.0390	0.0741	0.1045	0.1290
400	0.0095	0.0400	0.0751	0.1043	0.1288
Alloy Al 10 (9.84 per cent aluminum)					
as quenched	0.0062	0.0334	0.0657	0.0955	0.1203
160	0.0052	0.0324	0.0674	0.0973	0.1228
230	0.0067	0.0221	0.0383	0.0527	0.0648
300	0.0061	0.0219	0.0417	0.0589	0.0729
360	0.0041	0.0267	0.0582	0.0866	0.1081
420	0.0041	0.0200	0.0417	0.0592	0.0741
Alloy Al 11 (10.78 per cent aluminum)					
as quenched	0.0076	0.0374	0.0683	0.0966	0.1210
160	0.0091	0.0396	0.0730	0.1002	0.1274
230	0.0093	0.0264	0.0437	0.0574	0.0681
300	0.0083	0.0265	0.0478	0.0656	0.0803
360	0.0068	0.0318	0.0643	0.0918	0.1140
420	0.0053	0.0229	0.0456	0.0649	0.0806

TABLE VI
Effect of Tempering Time on Corrosion Resistance of 10.78 Per Cent Aluminum Alloy

Tempering Temperature in Deg. C.	Time, Hr.	Weight Decrease (Gm. per Sq. Cm.)				
		1 Day	2 Days	3 Days	4 Days	5 Days
230	2	0.0166	0.0508	0.0821	0.1050	0.1257
230	10	0.0141	0.0380	0.0598	0.0774	0.0941
230	20	0.0145	0.0386	0.0609	0.0793	0.0968
300	2	0.0148	0.0418	0.0685	0.0886	0.1070
300	10	0.0145	0.0425	0.0693	0.0900	0.1081
300	20	0.0147	0.0457	0.0756	0.0978	0.1189

TABLE VII
Corrosion Data for Cast and Annealed Magnesium-Aluminum Alloys

Designation of Specimen	Weight Decrease (Gm. per Sq. Cm.)					
	1 Day	2 Days	3 Days	4 Days	5 Days	
Al 4	C	0.0011	0.0111	0.0289	0.0475	0.0644
	L	0.0012	0.0104	0.0286	0.0470	0.0630
	H	0.0035	0.0206	0.0453	0.0689	0.0893
Al 6	C	0.0008	0.0117	0.0292	0.0445	0.0574
	L	0.0014	0.0123	0.0288	0.0432	0.0548
	H	0.0018	0.0153	0.0342	0.0513	0.0663
Al 8	C	0.0024	0.0190	0.0420	0.0633	0.0810
	L	0.0048	0.0217	0.0440	0.0640	0.0805
	H	0.0044	0.0312	0.0617	0.0870	0.1100
Al 10	C	0.0006	0.0154	0.0389	0.0601	0.0774
	L	0.0058	0.0300	0.0489	0.0733	0.0940
	H	0.0015	0.0154	0.0385	0.0601	0.0773
Al 11	C	0.0026	0.0190	0.0452	0.0711	0.0931
	L	0.0050	0.0308	0.0645	0.0955	0.1202
	H	0.0027	0.0157	0.0351	0.0510	0.0627

C=as cast, L=low-temperature annealed, H=high-temperature annealed.

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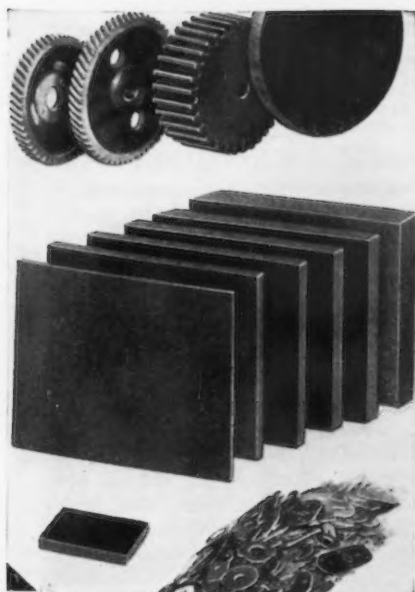
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THE IRON AGE, June 6, 1935—49

(CONTINUED FROM PAGE 48)

consists mainly of $Mg(OH)_2$; the black substance is richer in aluminum content than the original alloy, and hence the black color may be due to the fine deposit of the aluminum compound. Hence it is inferred that in the initial stage of corrosion the separated compound forms a cathode of local cell, and the magnesium base is attacked rapidly as an anode; after a short time, however, the surface of specimen becomes covered with the oxide or hydroxide of compound thereby greatly weakening the action.

Effect of Tempering Varies

In order to find the effect of tempering time, the specimen Al 11 was tempered at 230 and 300 deg. for a period of 2, 10 and 20 hr., respectively, and then the corrosion test was carried out. The results are shown in Table VI, in which it is apparent that the weight loss of the specimen tempered at 230 deg. for 10 hr. is less than that for 2 hr., while a slight increase is observed for the specimen tempered for 20 hr.; in tempering at 300 deg. the weight loss increases with the increase in tempering time. These facts are due to the progress of the aggregation of separated particles with the tempering time. A comparatively large weight loss observed for the specimen tempered at 230 deg. for 2 hr. is due to the insufficiency of segregation of the particles.

In studying the relation between the aluminum content in the specimens and the weight loss for five days' immersion, it was found that for the cast specimen the weight loss roughly increases with the aluminum content; for the quenched specimens, the increase in weight loss is very considerable, while the least weight loss is observed on the specimens of high aluminum content tempered at 230, 300 or 400 deg., which have a troostitic or pearlitic structure mentioned previously.

Table VII shows the results of corrosion tests on the cast and annealed specimens. As seen by the data the alloys Al 4, Al 6 and Al 8 indicate the same order of weight decrease in the cast state when subjected to the low-temperature annealing, while they indicate a marked weight loss when subjected to the high-temperature annealing or quenching. The struc-

ture Al 4 and Al 6 which are annealed remains unchanged from that of the cast state under the microscope, but in Al 8, Al 10 and Al 11 some compound is observable, the quantity being increased as the aluminum content increases. The alloys Al 10 and Al 11 indicate the least weight loss when subjected to the high-temperature annealing, while a marked weight loss is observed when the alloys are subjected to the low-temperature annealing and quenching. The specimen Al 10 having 9.84 per cent Al in the cast state contains a eutectic structure. The eutectic is, however, disintegrated and fine particles of compound are separated around the primary crystal when the specimen is subjected to the low-temperature annealing. When the specimen is subjected to the high-temperature annealing in the range of a single phase, a pearlitic structure arises. The increased attack observed on the specimen annealed at low temperature seems to be due to the increased heterogeneity owing to the imperfect diffusion of eutectic constituents.

In considering the above results, it is concluded that the corrosibility of magnesium-aluminum alloys increases by the application of heat treatment, but the corrosibility is less for those alloys showing troostitic or pearlitic structure. In general, resistance against corrosion is the greatest in the cast state and heat treatments have a harmful effect.

In summarizing all the foregoing data, the following three observations may be made:

(1) The effect of tempering magnesium-aluminum alloys is quite different from that of magnesium-zinc alloys; in the former the corrosibility decreases with the increasing amount of separated second phase, in the latter it increases.

(2) In magnesium-aluminum alloys tempered at a certain temperature, the troostitic or pearlitic structure appears; the alloys consisting of these structures are the most resistant to corrosion. This fact has been explained by anodic oxidation.

(3) In general, the resistance to corrosion is the greatest in the cast state for both magnesium-zinc and magnesium-aluminum alloys, and it decreases by the application of heat treatments such as quenching, tempering or annealing.

Streamlined Comet Is of Unusual Construction

(CONTINUED FROM PAGE 13)

The Comet is of the center-door type, with pneumatically operated doors and steps which, when closed, form a continuous line with the outside sheathing of the train. The center vestibules are formed by diagonally braced bulkheads connected to both the upper and lower longitudinal members and designed to increase the torsional rigidity of the train.

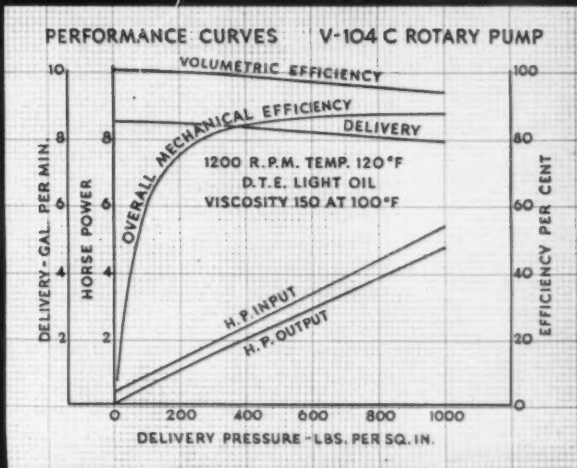
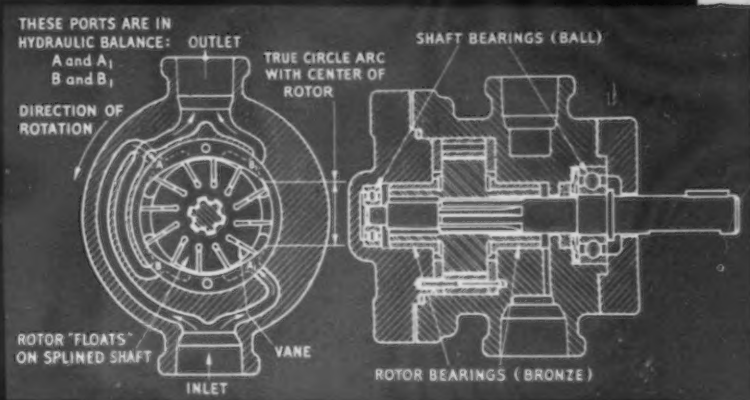
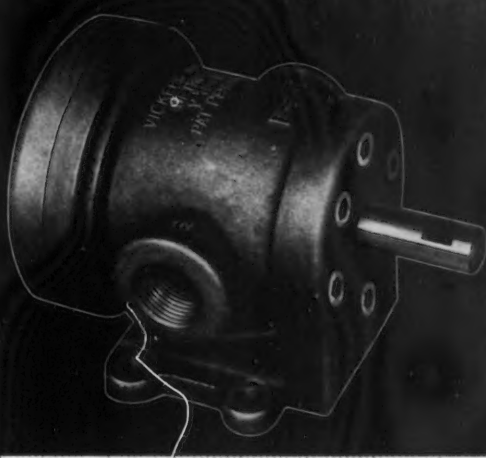
The weight of the 207-ft. train, in working order, is 253,300 lb. or 1580 lb. per seated passenger. A steam train of similar capacity, but of orthodox design and fabricated from the heavier materials, weighs close to 700,000 lb. The aluminum alloys used in the Comet have approximately the same strength as carbon structural steel but weigh only one-third as much. They may be referred to as duralumin-type alloys. The aluminum sections, which consist of extruded shapes, formed sheet members and castings, were assembled by means of cold-driven aluminum rivets. The Comet is the first train which has been built with the use of aluminum rivets throughout.

The Comet is built much closer to the rails than in conventional car design. The tops of the cars are 10 ft. 11 in. above the rails, except over the power plants, at which points they are 11 ft. 3 in. above the rails. The bottoms of the cars are but 10 in. above the rails. This reduction in height, accomplished by lowering the superstructure on the trucks, serves to bring the center of gravity of the train approximately 20 in. nearer the rails and increase the safety of the train at high speeds. The cars are of standard width.

Complete statistical data on non-ferrous metals are contained in the fifteenth annual issue of the year book of the American Bureau of Metal Statistics, 33 Rector Street, New York, which was published on June 1. The book contains statistics compiled by the Metallgesellschaft, the United States Bureau of Mines, the Bureau of Foreign and Domestic Commerce and the Bureau of the Mint as well as by many other sources. Among the metals covered are: copper, lead, zinc, gold, silver, platinum, antimony, nickel, tin, aluminum, cadmium, etc.

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Oriental Discovery Lengthens the Age of the Iron Age

By H. H. SLAWSON

A TINY speck of iron rust found by archaeologists on a bronze dagger handle almost 50 centuries old has raised the interesting question of what is the true age of the iron age.

For years the scholars have maintained that mankind began the use of iron around the year 1000 B. C. Then, by chance, an archaeological expedition from the University of Chicago's Oriental Institute unearthed this dagger handle, dating from 2700 B. C., and bearing traces of terrestrial iron.

The discovery, which lengthens the iron age almost 20 centuries, was unexpected and not without its romantic appeal aside from its weighty scientific aspect.

Fifty miles from modern Baghdad, in the ruins of the ancient holy city of Eshnunna, the tradition-shattering find was made. Digging in the dust which has covered Eshnunna undisturbed for ages, a native workman employed by the Chicago expedition accidentally drove his pick into what appeared to be a solid wall of sun-dried mud bricks.

The blow broke a large pottery jar concealed in a recess. When Prof. Henri Frankfort, in charge of excavations here, drew the mysterious vessel from its hiding place he found nested within it some 80 copper objects. They included over 60 household utensils, such as bowls, pails, saucers, strainers, lamps, bottles, a curious drinking tube, four daggers and numerous other objects.

An inscription still faintly visible beneath the thick patina of verdigris on one of the bowls indicated that some king of Eshnunna had dedicated the set of dishes "to Abu, god of the temple and lord of vegetation." From this hint the scholars have concluded that the dishes were used at ritual banquets during the spring festival held to further the fertility of crops and herds around Eshnunna.

Among the objects in the hoard

to which only casual attention was at first given was a bronze handle for a dagger of unusual perforated open-work design.

"When the incomplete state of this holder began to puzzle us," asserted Professor Frankfort, "and we were inspecting it in the work-room we seemed to find rust in the slit where the tang of the blade had been inserted. Mr. Delougaz (his assistant) at once carried out two independent tests in the laboratory, and each established the fact that iron was present in some form."

Explaining how the rust had not been noticed when the jar was unpacked, Professor Frankfort said: "It was extremely difficult to extricate so many fragile objects packed together in so small a space, and rain complicated the proceedings. Thus it will be understandable that we did not watch for a slight discoloration of the sand which had found its way into the jar and might be all that was left of an iron blade—particularly as no one could be expecting iron to be present in such an early context."

Unwilling to rest entirely on their own conclusions, the bit of rust with the dagger handle was submitted to a noted specialist in ancient metals, Prof. Cecil H. Desch of the British Association for the Advancement of Science. Inside the old handle Professor Desch found another small lump of rust that had worked loose but was too large to jiggle through the perforations.

His chemical analysis of these bits confirmed that of the Chicagoans and, since no trace of nickel was found, the British savant concluded that the iron could not have been of meteoric origin, as has been the case with many early objects of iron found elsewhere.

"The position in which the rust was found," Professor Desch stated, "leaves no doubt that the blade of the dagger was of iron.

... The occurrence of an iron object of terrestrial origin at such an early date is most striking and of the first importance for the history of ancient metallurgy."

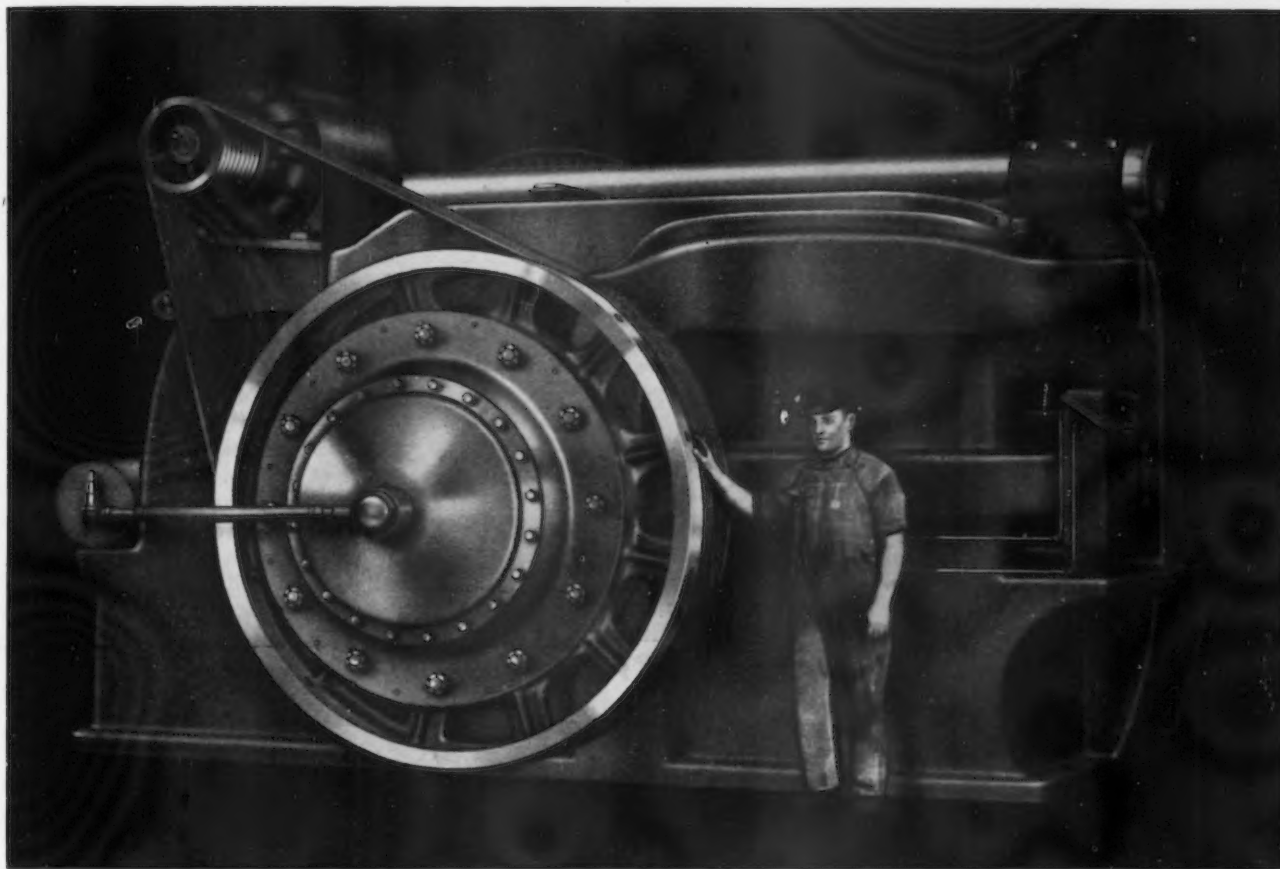
Professor Frankfort, in discussing the find, questioned the evidence supporting the theory that a knowledge of the use of iron in fabricating weapons and utensils did not become general until around 1000 B. C. He pointed out that in some of the ancient tombs where iron objects had been found the pottery found alongside the metal argues against this date.

"It seems to be," he concludes, "that the iron blade of our knife must have been an importation from the North, where iron was occasionally used in the third millennium B. C. (the period of the Eshnunna find), but not exported because it was less serviceable than well-hammered copper or bronze."

The eventual spread of the use of iron, he contends, was due, "not to the discovery that iron could be obtained, but to the discovery of new methods for casting and working the metal."

Further strength to this new theory regarding the beginning of the iron age is added by the discovery of a varied assortment of iron objects when another expedition from the Oriental Institute was digging among ruins at Ali-shar, in Anatolia. Included in their finds is an assortment of "modern" hardware, such as nails, bolts and rivets, a ring, a belt hook and numerous weapons, including a spear head, arrow heads, daggers and knives, all made of this new metal. Efforts to establish the date of the mound where these relics occurred have been vain, except that indefinite clues indicate its existence there prior to 1200 B. C. The variety, however, indicates that considerable progress had been made in the utilization of iron more than 200 years before the accepted "opening" of the iron age.

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Advantages of Stainless Steel and Vitreous Enameled Iron in Architecture

By M. J. R. MORRIS and
KARL KAUTZ

Republic Steel Corp., Massillon, Ohio

STEEL products used for building exteriors have many architectural advantages. The rate of building with prefabricated metal is much faster than with stone or brick. There is not the usual delay necessary for the setting of cement, and large exterior surfaces are covered with a minimum of weight handled.

The ease of erection is an item of great consideration. The stainless group of steels lend themselves readily to welding and riveting directly to the steel skeleton as well as with the usual clips and screws.

Vitreous enameled iron parts require different methods of attachment. Since welding and riveting would be injurious, various methods of fastening have been devised which are interlocking, making use of keys, clips and bolts. In either case, ease and rapidity of erection are accomplished.

The use of exteriors of steel products permits much thinner walls, which, in turn, create more effective floor space. In large buildings this alone is worthy of careful consideration.

Advantages in Applying Insulation

Walls of metal construction lend themselves admirably to effective insulation against heat and sound. The insulation industry is making tremendous strides and very many forms of insulation, such as corkboard, fiberboard, rock wool and asbestos cements, are now available for specific cases. For

instance, a 1/16-in. sheet metal exterior to which a 1-in. fiberboard is cemented and finished with a 1/2-in. coat of plaster would weigh 8.5 lb. per square foot, transmit 0.254 B.t.u. per square foot per degree Fahrenheit temperature difference per hour and have a total thickness of 1 9/16 in. A solid masonry wall of equivalent heat flow would have a weight of 85 lb. per square foot and a total thickness of 10 1/2 in., including the furring strip. These figures clearly show the advantages in construction of metal exteriors over the usual masonry types as regards weight and thickness.

Strength and Safety Promoted

The strength and safety of all-steel buildings have been amply demonstrated in regions of severe windstorms and tornadoes. The steel structures remain where wood and masonry structures are demolished. A steel building is naturally fireproof, especially if insulated with a mineral or inorganic insulation. That the safest place to be in electrical storms is in a steel building properly grounded has long been known.

Another factor which is promoting the advent of the all-steel building is air conditioning. The science of air conditioning is increasing rapidly and it is predicted that before another decade has passed, houses and buildings will be so constructed and sealed that windows will probably never be opened.

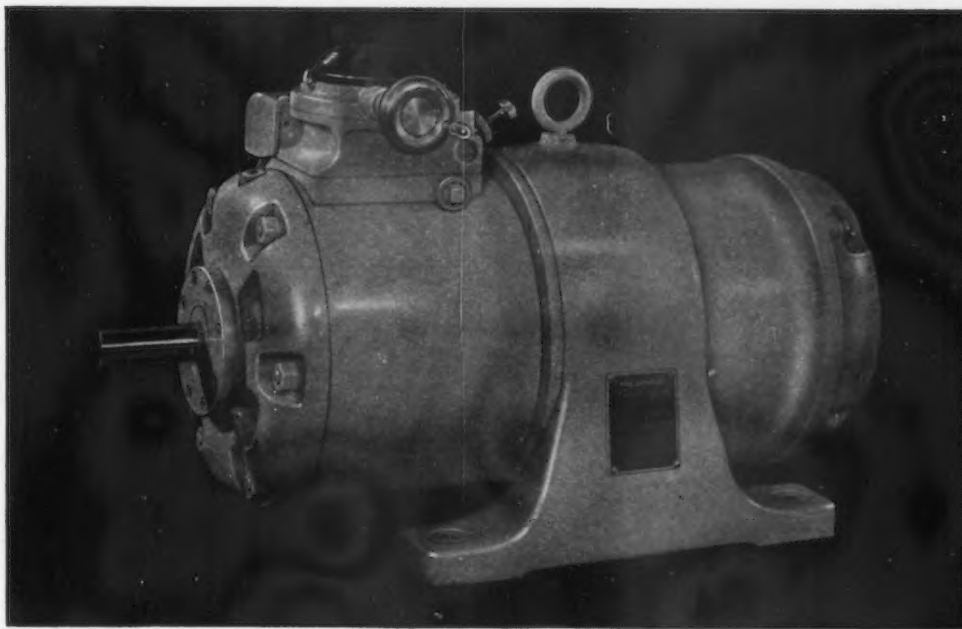
Declining lumber supplies have forced builders to look for other more durable materials with which houses of the future may be fabricated. With extensive use of stainless steels and vitreous enameled

irons, the cost of buildings will be greatly reduced in spite of increased lumber prices.

Stainless steel or iron is rust-proof, non-corroding and permanent. It will not tarnish or become dull when exposed to atmospheric agencies and its gleaming beauty is unequaled by any metal except chromium itself. It cannot chip, crack or wear thin, as it is the same metal all the way through. It can be cleaned easily with water and soap or various commercial cleaning solutions. One of the outstanding characteristics of stainless steel is the ease with which it can be fabricated. All fabricating operations such as drawing, punching, shearing, riveting, welding, soldering, brazing and silver-soldering can easily be performed on stainless steel.

Vitreous enameled iron possesses architectural advantages as well. It has permanent beauty with an unlimited range of color in either bright or matt finish. Any design or painting can be faithfully reproduced in original colors. The iron, being permanently and completely covered by glass, cannot rust or corrode and is practically everlasting. Vitreous enamel is very economical in upkeep, colors never fade and there is never any need for repainting as with wood surfaces. Dust and grease do not adhere firmly to the hard, smooth surface, and simple washing with soap and water will restore the original beauty. Any desired form can be made of enameling iron, and this later put in the everlasting vitreous enamel finish. Vitreous enameled iron is readily available, as competent enameling concerns may be found in all larger cities.

Abstract of paper read before the symposium on materials of construction in the building industry at the Chemical Industries Tercentenary Meeting of the American Chemical Society, Hotel Pennsylvania, New York, April 23.



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Variable Speed
TRANSITORQ

Testing Organic Finishing Materials for Metal Surfaces

(CONTINUED FROM PAGE 15)

singly or in combination for adhesion, flexibility, resistance to weather, moisture, heat and numerous other conditions suggested by the character of the application.

Tests for stability are useful when examining materials intended for application by dipping and flowing methods. Pigments should

materials is popularly obtained by two methods. The Stormer viscosimeter is used for the standard laboratory method. In this device, a rotating cylinder, driven by a falling weight, is immersed in the material and the time determined for 100 revolutions. For the second method, a small portable vis-

room temperature in a location free from drafts. The film is examined at intervals and the time is recorded when it no longer feels tacky under a light touch of the fingers (tack-free drying time), and when it is no longer permanently marred by a piece of 12-oz. duck pressed against the panel under a pressure of 1 lb. per sq. in. (print-free drying time).

The baking materials are applied to steel panels and baked at various temperatures from 110 to 175 deg. C. At intervals, small strips are cut off the panels and examined for tack-free and print-free drying time, as explained above.



THREE test cylinders for determining durability of finish. First cylinder is newly finished; second shows a finish which has failed; the third, a finish which has stood up satisfactorily.

remain in suspension and not form a cake on the bottom of the container. Thickening, which sometimes is referred to as livering or jelling, and the rapid formation of skins on the surface should not occur. To test a sample for these effects, portions of the liquid material are thinned to the working consistency, placed in loosely covered containers and examined daily. The formation of curdy or precipitated matter during this test indicates that the thinner is not compatible or has too low solvent power.

Determining Viscosity and Solids Content

The viscosity and solids content are determined so that an estimate can be made of the intrinsic value of the finishing material, the amount of thinning required to produce a working consistency, and the build and coverage to be expected. Viscosity of finishing ma-

cosimeter, known as the Demmler cup, has been developed for general shop use to control the viscosity of finishing materials. This device is cone-shaped, with a small orifice in the bottom. When floated in the material, it sinks slowly as a result of the inflow of material through the small orifice. The time required for a specific volume of material to flow into the cup is the measure of viscosity.

The solids content usually is determined by standard methods in which a weighed portion of the material is heated until the volatile matter is driven off, and the weight of the dried film determined.

Tests for Drying Time and Hiding Power

The air-drying materials used in determining drying time are brushed or sprayed on non-absorbent panels, such as glass, steel or micarta, and are allowed to dry at



TEST for measuring adhesion of finishes.

In examining for working properties, the finishing materials are tested for ease of brushing, adaptability for application for spraying, flowing or dipping.

To obtain the spreading rates for all types of finishing materials, including lacquers and quick drying enamels, the Westinghouse hiding power test was devised. Since the method is based on the weight of the dried film applied to a panel, the panels may be coated by spraying, with the materials thinned to any desired consistency, and loss of material from spray dust may be completely ignored.

In this test, metal panels with a design on one side, of contrasting black and gray squares, are coated with the least amount of material that will just obscure the design. After oven-drying the panel to constant weight, the weight of the dried film on the panel is obtained. The hiding power in square feet per gallon can then be computed from the following formula:

$$\text{Hiding power} = \frac{26.28 G A S}{W}$$

= sq. ft. per gallon
 G = specific gravity of the material
 A = area of the coated panel (sq. in.)
 S = solids content of the material (% solids)
 W = weight of the dried film (gms.)

Examining the Dried Films

Steel panels are employed by Westinghouse in the examination of the dried films for appearance, adhesion, flexibility and durability. Cold-rolled sheet steel of 0.010-in. thickness is used for almost all test work and for panels which are to be placed in file for future reference. The smooth surface is well adapted for close observation of color and gloss, and for comparing different materials for adhesion and flexibility. Pickled hot-rolled sheet steel of 1/16-in. thickness is used for panels that are intended for exposure tests outdoors, in the accelerated weathering machine and in the humidity cabinet.

An important step in the preparation of the panels for test is the cleaning of the surface before applying the material. Badly rusted panels are not used, and those slightly rusted are rubbed thoroughly with fine abrasive cloth until all appearance of rust is removed. Oil, grease, and dirt are removed by washing with solvents, rubbing with fine steel wool, and wiped with clean, dry cloths. The cleaned surfaces are not touched with the fingers before coating, and are coated immediately after cleaning.

The materials are applied to the panels by various methods, which depend upon the particular method used in applying the finishing materials in production. As spray painting is used extensively in the Westinghouse plants, most of the panels are coated by spraying. The other methods used occasionally are brushing, dipping and flowing. The coated panels then are air-dried until the coatings are print-

Stop Cadmium Plate OXIDATION!



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Immediately after cadmium plated parts are removed from the plating solution, they are dipped in Roxalin's CLEAR CADMIUM WATER DIP LACQUER. No drying necessary. Any water remaining on the plated pieces does not interfere with its adhesion—its tarnish-proof action.

SEND FOR TEST SAMPLES

So that you can see for yourself how completely effective this finish is, we want to send you a cadmium plated test piece, *one-half* of which has been

protected against oxidation by Roxalin CLEAR CADMIUM WATER DIP LACQUER. Examine this test piece closely and note how perfectly the Roxalin Cadmium Lacquer protects the bright metallic finish. Write for this convincing demonstration today—there's no obligation. Address your request to Dept. 802.

LEAFLEX for Cadmium Surfaces

If you are scratch brush finishing your cadmium surfaces, you will be interested in Roxalin LEAFLEX. LEAFLEX offers a semi-matt, silver finish not unlike scratch brushing. Many manufacturers use it as a satisfactory substitute, thereby effecting considerable economy. LEAFLEX shows remarkable adhesion to cadmium, is spot-proof and adds to the rust protection of a cadmium surface. Write for sample strip and complete information.

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ROXALIN Flexible FINISHES
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free; or, in the case of baking materials, are baked until hard.

Before the coated panels are subjected to tests, they are placed in a low-temperature oven for varying lengths of time to age the film. Lacquers age rapidly and usually are removed from the oven after a few hours. Paints which contain drying oils age slowly and are often kept in the oven for several weeks to obtain complete drying of the film by oxidation.

To determine the resistance of

the coatings to weathering, the panels are placed outdoors at an angle of 45 deg., and are faced toward the south. The panels are examined at frequent intervals to observe changes in color, gloss, rusting and cracking of the coating. One end of each panel is protected from the weather by a flap, so that a comparison can be made at the end of the test between the protected and the exposed coating.

In order to obtain quicker results from the weathering test, du-

plicate panels are placed in the accelerated weathering machine and subjected to repeated changes of ultra violet light, heat and moisture, until the film fails. The breakdown effect produced by the machine is similar to that produced by direct outdoor exposure, except that the deterioration is more rapid. No definite connection has been found between the rates of failure in the machine and outdoors, but for some types of material one month in the weathering machine produces effects similar to one year of outdoor exposure.

Coatings which are to withstand severe moisture conditions are placed in the humidity cabinet and observed for blistering and softening of the film. The panels are placed in openings on the sides of the cabinet with the coated side toward the inside. The cabinet contains water vapor at a temperature of 110 deg. F., which continually condenses on the coated side of the panel. For a rapid determination of resistance to moisture, small panels are immersed in water at room temperature and observed at frequent intervals for softening, blistering and bleaching.

Adhesion Test

Tests for adhesion are made with a device known as the Westinghouse hardness tester, which consists of a rounded blade pressed against the coated panel by means of a calibrated spring. The pressure required to cut through and scrape the finish off the panel is recorded as a numerical rating for adhesion.

Numerous other tests are used, depending upon the exposure conditions which the finishing material must withstand. Resistance to oil, acids and alkalis are determined by direct immersion in the respective solutions and observing the effect of these on the films at frequent intervals. Flexibility is determined by bending the coated panels over a 1-in. mandrel and observing the film for signs of cracking or peeling. Microscopic examination of panels exposed outdoors or in the weathering machine is made by using a magnification of 25X to observe failure by checking or cracking. In their early stages, initial failures of these types are not visible to the naked eye.

In the selection of finishes, the aim is to use only those tests which

have a definite relation to the conditions of exposure or shop application. The interpretation of the results depends entirely upon the judgment of the observer, because satisfactory materials frequently will fail to some extent as a result of the severity of the accelerated

tests. The best results from such tests usually are obtained by experience with the performance of materials under normal and accelerated conditions and by learning to what degree the results obtained from tests are a measure of actual service conditions.

Electrolyte Used with Current Shortens Time of Pickling

A NEW pickling method employing a chemical process and the use of electrolyte composed of an organic as well as an inorganic acid has been developed by the Ferro Enamel Corp., Cleveland. Alternating current is used to stimulate the reaction time in pickling instead of depending solely on electrochemical reaction for the efficiency of the system. No direct connection between the work and the electric circuit is required. Ferrolite is the name applied both to the system and to the electrolyte.

The inorganic acid serves as a carrier for the current and as a source of attack upon the iron, and the organic acid, which has a great affinity for the sub-oxides of iron, acts as an agent to dissolve the lower oxides of the metal and as a regeneration catalyst for the reproduction of the inorganic acid in the bath.

A sulphuric acid in the ordinary pickling bath, it is pointed out, is discarded when the iron, present as ferrous sulphate, reaches the point where the pickling rate slows up appreciably. Much free acid is still present, but is lost in order to maintain a normal production schedule. With the Ferrolite pickling method the ferrous sulphate is oxidized to ferric sulphate and this combines with the normal salt of gluconic acid, or ferrous gluconate, to form ferri-gluconic acid, which has an iron content of approximately 19.6 per cent. This permits the sulphate ion to combine with the hydrogen and form sulphuric acid.

Advantages claimed for the organic-inorganic reaction include longer life of the pickling solution due to the destruction of the ferrous and ferric sulphate present, lower acid cost due to the regeneration of the sulphuric acid in the tank, and a better finish obtained more rapidly on the pickled metal, due to the breakdown of bonded

oxides underlying the Fe_2O_3 as they combine with the free organic acid to form ferrous gluconate.

Very dense graphite electrodes are spaced at intervals along the sides of the tank, each tank side then being connected to one leg of a 6 to 12-volt transformer. Current densities are calculated at 6 to 12 watts per gal. of electrolyte used.

The system, it is stated, permits the use of less inorganic acid because of the reduction in pickling time and because the tanks can be operated with a higher percentage of iron, and the reduction in the amount of inorganic acid required is sufficient to offset the cost of the Ferrolite acid and the current.

The system may be used in any pickling tank which does not have a metallic lining and in which it is possible to install electrodes with enough clearance to prevent work from contacting with the electrodes when going into the tank. It can be applied to any type of still or agitated batch pickler or to any continuous pickler. It is said to be adaptable for pickling finished and semi-finished steel in various forms. The process, which is patented, is to be licensed to purchasers of the Ferrolite addition agent.

Tyson Roller Bearing Corp., Massillon, Ohio, has just published a complete new manual of engineering data for application of tapered roller bearings to mine and quarry cars and other industrial haulage equipment. The Tyson lip seal, labyrinth seal and recently developed combined nut and lip seal are fully described and applications explained by text and mechanical drawings.

Large Double-End Pipe Threader Arranged for Rapid Production

FOR simultaneously milling the thread on both ends of large pipe and designed particularly for threading oil well casing pipe, a threading machine which is believed to be the largest pipe threader ever built has been brought out by the Lees-Bradner Co., Cleveland.

The machine, designated as the Model D.E., has a capacity for threading pipe 4½ to 16 in. in diameter and from 20 to 41 ft. in length. It weighs 70,000 lb. and its operation requires seven motors. The first of these machines has been placed in operation in a leading steel fabricating plant, where it is being used in threading high-carbon, high-manganese steel pipe, commonly designated as Class D.

Advantages claimed for this pipe threader include highly accurate work, improved finish of the thread, greater production, and assured alinement of the threaded ends because of simultaneous threading.

On the massive 54-ft. long bed are mounted duplicate heads, one at each end, which traverse along the bed toward and away from each other for loading and unloading.

Pipe Positioned by Jacks

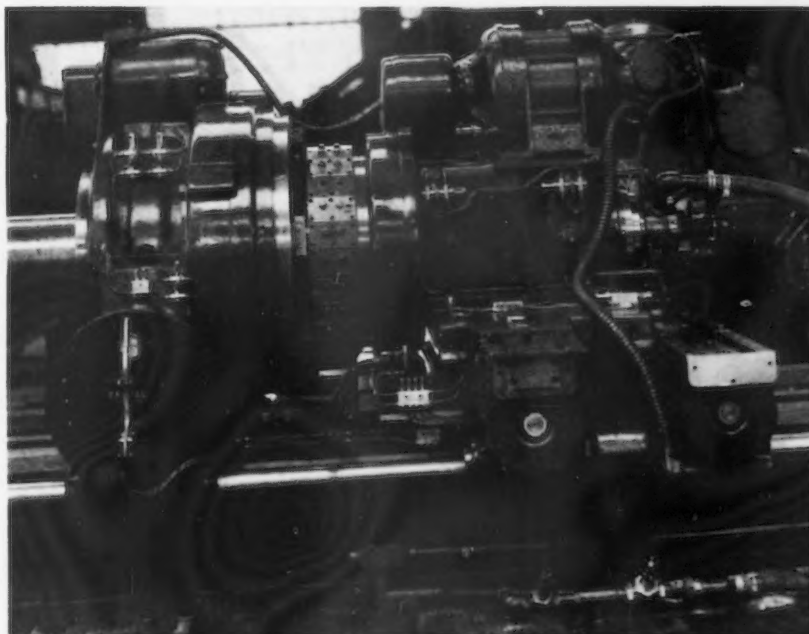
Pipe is delivered to the machine by two pneumatic jacks which raise it to the height of two rail cross-members. From these the pipe is rolled to a position in line with the two spindles and two other pneumatic jacks elevate it so that the axes of the pipe and

spindles are substantially in line. With the pipe thus in this position, the two heads are moved toward each other and the spindles and chucks telescope the pipe ends. This movement continues until the pipe projects beyond chuck jaws and into cutter heads a proper distance. This forward movement of the heads is stopped when the ends of the pipe strike two stop plates within the cutters; the contact with the plates interrupts the control circuit and stops the two 3-hp. motors that actuate the heads.

This control arrangement contemplates variation in length of the pipe.

The next operation is closing the chucks. These are screw-actuated, electrically-operated universal chucks. Each is driven by a 2-hp. high-torque motor, geared to the chuck jaws. The motor is started by momentarily pressing a contact button, causing the jaws of the chuck to close on the pipe and to center and grip it. As soon as the pipe is gripped the pressure on the button is released. To open the chuck there is a second button which reverses the movement. As soon as the pipe is gripped in the chuck the two jacks that have been supporting it are dropped,

(CONTINUED ON PAGE 114)



Close-up view showing the rear of one head unit of large pipe threader in operation.



General view of large double-end pipe threading machine in steel fabricating shop, showing jack-operated devices for unloading the pipe.



NEWS OF THE WEEK

Structural Steel Fabricating Industry Has Failed to Share in Recovery

THE steel construction industry has experienced its worst volume and prices during the past three years, according to a survey just completed by the American Institute of Steel Construction, New York.

Despite the large expenditures for public works the sale of fabricated structural steel has not recovered. The tonnage of fabricated structural steel sold for city, State and Federal projects during 1933 and 1934 was appreciably less than that volume sold for similar projects in 1930, 1931 or 1932.

The institute has just completed

a tabulation of steel going into construction work during the years 1923 to 1934 inclusive. This is the first time that such data have been amassed in detail.

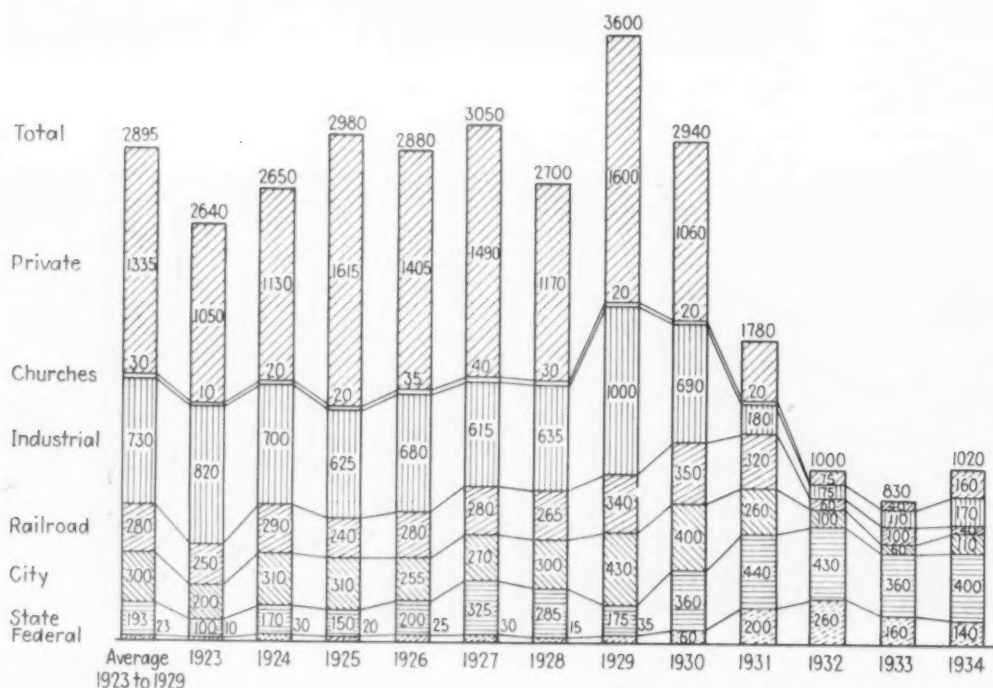
As shown on the attached chart, the low point of production was recorded during 1933. The low point of unit price was recorded during 1932 and 1933. During 1934 the total volume of steel construction sold for public and private works was comparable to that volume sold in 1932. While there had been a slight recovery in the unit price of erected steel, this was not sufficient to compensate the in-

dustry for the increase in the cost of the plain material. It is clear, therefore, that the price structure is today the worst that the industry has experienced during the depression.

The chart also shows the tonnage of fabricated and erected steel going into different classes of projects. It indicates what types of construction projects have been available to this industry during the past twelve years and their relative volumes.

Private work as recorded in the chart includes such things as apartment houses, office buildings and structures of a similar nature. During the period 1923 to 1929, inclusive, that was a particularly profitable field of operation. There was a slight upturn in this class of work during 1934.

The records show that for the



TONNAGE fabricated structural steel and sources from which it was derived.
(In thousands of tons)

period prior to the depression what is known as public works was a minor factor. Steel construction sold to the cities constituted by far the major volume, with State work following and Federal works occupying but a minor place.

The volume of public works reached its maximum in 1930 and 1931. The volume of structural steel in public works in 1932, 1933 and 1934 began to drop back perceptibly. State construction is today by far the most important.

Taking the price at which fabricated structural steel was sold and erected in 1926 as 100, it is found that the prices received during 1923, 1924 and 1925 were slightly better than this, but were less during 1927 and 1928. The

price received for fabricated structural steel erected in 1929 approximated the 1926 level.

Profits, however, were sacrificed during succeeding years. The price at which structural steel was sold in 1930 was 90 per cent of the 1926 level. It dropped to 83 per cent in 1931 and to 69 per cent in 1932. With the advent of the steel code the price of plain material advanced in 1933 and held firm during 1934, and while the costs of material and labor went up appreciably during these two years, the fabricated price level failed to improve in like proportion. The price at which erected structural steel was sold in 1933 was but 70 per cent of the 1926 level and in 1934 it was but 78 per cent of that base.

has been secured in the price structure.

"Every business executive owes it to his stockholders and the employees of his company to exert every effort to secure the cooperation of all elements of business in an endeavor to work out a constructive program and prevent the cutting of wages and the demoralization of markets. Rules of fair trade practices which have been agreed to by business groups under the operation of codes have been helpful in establishing a generally higher standard of business.

Thomas R. Akin, president, Laclede Steel Co., St. Louis: "The inability of industry to control prices on account of the anti-trust laws has always meant, under depressed conditions, demoralization through internal causes or from demands of buyers for lower prices. Diminished earnings or extensive losses follow, resulting finally in inability to pay adequate wages. As we must have fair profits and labor a remuneration above the cost of living to insure satisfactory economic conditions, we believe industry should be given the opportunity to control its own affairs under proper legal restraint so as to do away with destructive competition. Better ability to endure a depression and better standards of wages would undoubtedly follow."

Harry Scullin, president, Scullin Steel Co., St. Louis: "The Supreme Court decision will make no change what ever in our policies. We will go right along just the same as under the code. We will pay the same wages, maintain the same prices and 'play the game' the same as if we had a code."

E. T. Weir, chairman, National Steel Corp., Pittsburgh: "We certainly expect to continue to pay the present wage scales and to maintain present hours and working conditions. I can see nothing in the present situation that will necessitate the making of any change whatsoever."

Steel Institute Directors Declare for Wage Standards and Trade Practices

DIRECTORS of the American Iron and Steel Institute in special session Monday adopted resolutions calling upon individual members of the iron and steel industry, voluntarily during the present uncertainty, to maintain present rates of pay, maximum hours and the standards of fair competition as set forth in the steel code.

The board also urged members to continue to protect the employees' rights of collective bargaining.

The resolutions follow:

Whereas the chairman of the National Industrial Recovery Board has issued a statement with regard to the decision of the United States Supreme Court in the Schechter Poultry Corp. case in which he expressed the hope "that all employers heretofore operating under approved codes and all their employees will cooperate in maintaining those standards of fair competition in commercial and labor relations which have been written into the codes with practically universal sanction, and which represent a united effort to eliminate dishonest, fraudulent trade practices and unfair competition in overworking and underpaying labor; and

Resolved that it is hereby declared to be the sentiment of the board of directors of American Iron and Steel Institute that the individual members of the iron and steel industry, acting voluntarily, during the present uncertainty, maintain the present rates of pay and maximum hours of labor and the standards of fair competition which are set forth in the steel code,

and that the members of the industry continue to protect the employees' rights of collective bargaining.

Resolved that the executive secretary of the institute be, and he hereby is, authorized and directed to send a copy of these resolutions to each member of the iron and steel industry.

Individuals Take Similar Stands

Similar sentiments were voiced by individual members of the industry. Some of these follow:

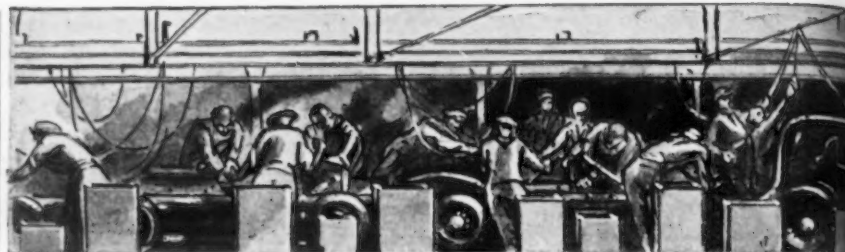
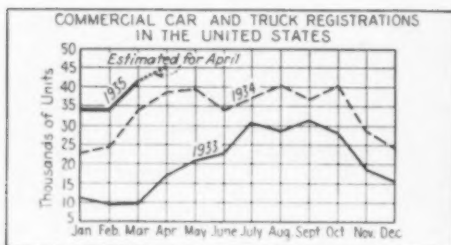
T. M. Girdler, chairman and president, Republic Steel Corp., Youngstown: "It is my hope and my belief that the steel industry, as a whole, will stand solidly together for a continuance of the wage standards and the methods of fair competition developed under the steel code.

"During the past two years, a new spirit of cooperation and fair play has grown up in the steel industry to the benefit of employees, customers and the industry itself, and I believe steel men everywhere will support any effort on the part of the government to develop a constructive program which will preserve these benefits."

Charles R. Hook, president, American Rolling Mill Co., Middletown, Ohio: "Whether we approve or disapprove of the economic philosophy which was the basis for the recovery act, we must recognize that as a result of the codes large wage advances were made and in our major industries at least some degree of stability

Detroit Scrap Mart Holds Its Strength

DETROIT, June 4.—The local scrap market is marking time as the result of the hesitancy of consumers to make sizable purchases until they see what effect the passing of NRA may have. Some orders have been placed by steel companies outside the Detroit district but the local mill continues virtually out of the market. Prices are fairly steady.



THIS WEEK ON THE

Car Output Shows Seasonal Decline; Retail Sales Are Well Sustained

DETROIT, June 4.

THE zip and zest which characterized the automobile industry for months apparently has played itself out. Operations still are at a height which would have aroused enthusiasm in the dark days of the depression, but today they scarcely create a ripple of excitement.

Much more noticeable than any falling off in the number of cars assembled has been the deflation of orders for parts and materials. Parts makers have dropped extra shifts and reduced the working week of their regular employees. In many cases the current rate of production is only a fraction of what it was recently. Steel releases are in constant lessened volume.

This situation is easily explained. Ford deliberately overbought steel earlier in the year and is roughly estimated to have covered its needs for over 900,000 out of the minimum of 1,000,000 cars and trucks which it will build in 1935. Chevrolet, delayed first by inability to secure turret tops and then by the Toledo strike, is understood to have as many as 130,000 of certain parts fabricated ahead. The light dribble of steel orders from the two leading car makers, therefore, is to be expected.

Production of cars dipped sharply the past week because of the Memorial Day shutdown. Ford closed the Rouge plant Tuesday night and did not reopen until Monday morning. Most General Motors and Chrysler factories were idle from Wednesday night until Monday. If there had been any urgent need for cars in the field,

cessation of work would have been limited to one day.

Used Car Situation Troublesome

Ford's daily rate at the Rouge plant continues to call for 5500 to 6000 units. The June schedule still stands at 120,000 to 130,000 cars. What Ford will do after this month is problematical, although a considerable reduction in assemblies appears to be in order. Ford dealers have not been selling used cars as rapidly as new cars with the result that used car stocks have become abnormally large. Concentrated sales drives have been made by Ford dealers working cooperatively to relieve this situation, but even with this help the number of used cars on hand is excessive.

Most other car manufacturers, with the exception of Chevrolet, are in the same predicament as Ford in that their dealers have too many used cars. Ordinarily, a dealer should sell one and a half used cars for every new car. The ratio, however, has been nowhere near what it should be. Chevrolet, taking advantage of the period during which it could not get new cars, staged intensive campaigns to help dealers clean out stocks of used vehicles.

Retail sales of new cars have been well maintained throughout the past month. The experience of Dodge dealers perhaps is a good example of the industry's performance. During the week ended May 4 they sold 9076 units. The total fell to 8416 units the next week and then rose the week of May 18 to 8697 units. A further rise to 9002 units occurred the week of May 25. These sales consisted of Plymouth

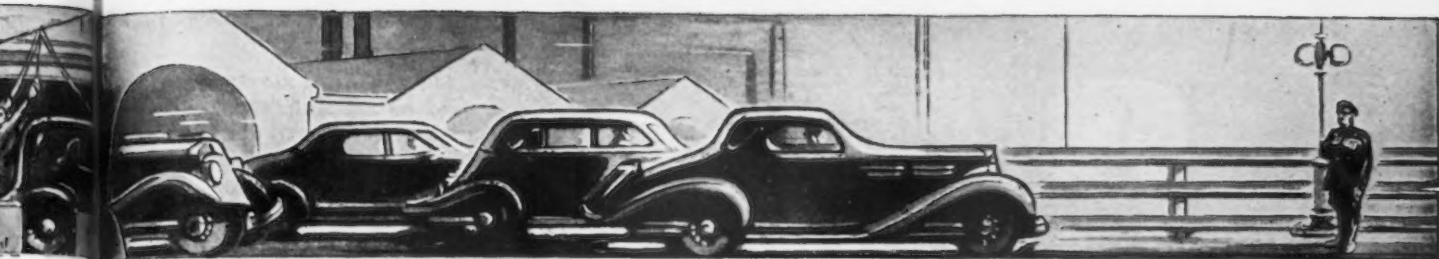
and Dodge passenger cars and Dodge trucks.

Chevrolet is the only large-volume manufacturer with a full production schedule for June. With dealers in many districts short of Master models, it intends to push its 10 assembly plants to their utmost capacity in the next 30 days, and possibly longer. Since the 1936 season will be under way in September, it appears likely that Chevrolet will sustain its operations at a high rate during July as well as June. At the last count of passenger car registrations, Ford led Chevrolet by 121,893, a margin so wide that even Chevrolet partisans are making no claims that the gap can be closed this year as it was last. However, Chevrolet has a fighting organization and this year may well duplicate its showing in 1934, when it sold more cars in the last half than in the first half.

Chrysler operations have displayed a staying power which observers little expected earlier in the year. Of course, Plymouth got a certain amount of business at the expense of Chevrolet when the latter's dealers were short of cars, but even so, the volume of retail sales by all Chrysler divisions has been a pleasant surprise to the Chrysler management. Assemblies in May were around 85,000 units and in June should be about 75,000 to 80,000 units.

Hours May Be Longer

The motor car industry unceremoniously buried its code last Tuesday without shedding a tear. Believing in free and open competition, with individual initiative and



ASSEMBLY LINE

resources as the main driving force carrying it to success, the industry did not want a code in the first place and accepted one only under severe pressure from Washington. It asked nothing of the Administration, but, in an effort to help the national recovery effort, took on itself increased labor costs through higher wages and shorter hours. Despite the sudden demise of NRA, the industry is pledged by its leaders to continue the present high wage scale.

In view of the opposition voiced by influential members of the industry to code provisions regarding limitations of the work week, it is probable that some companies will lengthen the number of hours worked by their employees so that the latter can augment their incomes. While the hourly rates paid by the industry are on a par with those in 1929, employees at best have not been able to earn more than 60 to 75 per cent of their 1929 incomes because of code restrictions, and the earnings of some have been far less.

The collapse of NRA will be felt most in the retail trade, where the dealers' code has been administered by the National Automobile Dealers' Association. The code authority, headed by F. W. A. Vesper, made a great hullabaloo over the almost unanimous backing which it claimed the code had in all parts of the country. An impartial investigation, however, will reveal that the trade was split wide open over code enforcement, with many of the more powerful and efficient dealers flat-footedly refusing to subscribe to the code. It was a case of a code being designed chiefly to give protection to all the "weak sisters," when everyone conversant with conditions knew that only 60 to 75 per cent of the dealers, from the standpoint of efficiency and intelligent management, deserved to stay in business.

Few people outside the inner circles know in what an embarrassing

BY BURNHAM FINNEY

Detroit Editor, The Iron Age

o o o

position car manufacturers were put, so far as stating their position on the retail code. The only smart thing to do was to stay in the middle and be non-committal as long as possible. However, Mr. Vesper and his lieutenants finally succeeded in turning on the heat so intensely that manufacturers openly gave lip service to the code. One suspects that after doing this they ran for storm cellars to escape the blasts from powerful dealers in the non-conformist group.

While the retail association plans to continue voluntarily many of the NRA code principles, it is a safe bet that the used car pricing system will not be sufficiently well maintained that the car owner won't again be able to "make a deal." Incidentally, cars in the upper price brackets suffered most from code provisions regarding trade-ins. Discounts on quality cars are large enough that dealers have always had some money to "play with" in making sales, yet the code denied them that privilege and compelled them to offer sums so small for used cars that many owners decided not to buy new cars.

Oldsmobile Buys Equipment

Oldsmobile has placed orders for a substantial number of machine tools for which it is understood to have spent around \$250,000. This is part of the program for expanding the capacity of the Olds plant at Lansing. It is probable that still further expenditures will be made in the near future. Plymouth and Dodge are expected to start an equipment buying program this week. It will be the first time this year that Chrysler has made cap-

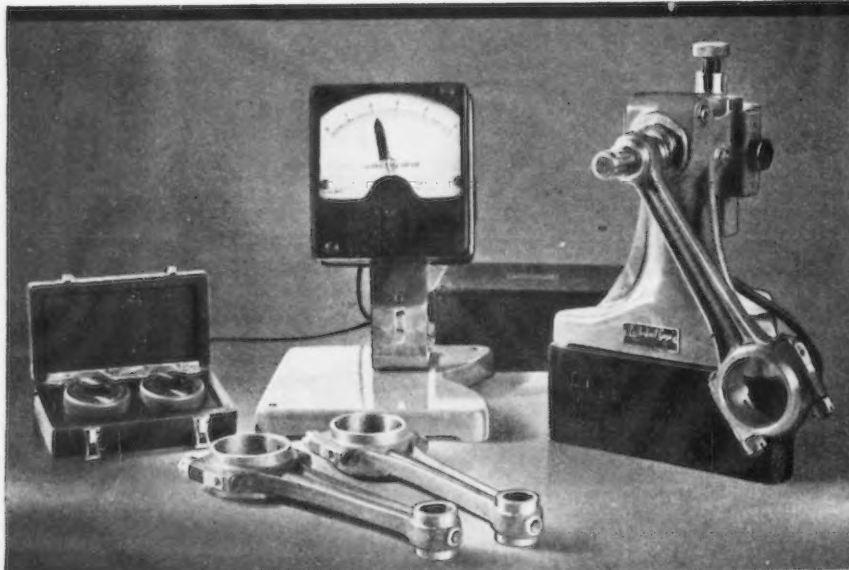
ital outlays for new machinery. In view of its large profits during the first quarter, it is not surprising that the corporation now should be planning to plug up weak spots in its production lines. Contemplated orders involve stamping presses as well as machine tools.

Packard, which has boosted its output to an all-time high, has taken bids on machinery to increase its hourly production of parts for the 120 job and presumably will act on this program shortly. Chevrolet has pending a large tooling program for its local gear and axle plant. It is not yet clear what this involves, but it is intimated that the amount of money to be spent may run into seven figures. Ford will continue to be an important factor in the machine tool market during the next two or three months. Several machine tool companies are privately predicting that if a reasonable percentage of the prospective automotive business is translated into orders, they will be turning down orders shortly because they cannot meet delivery requirements.

General Motors of Canada tentatively is planning to manufacture the coming year at St. Catharine's Ont., the transmissions for all its cars which heretofore have been built at Buick in Flint and at Chevrolet in Toledo. It is possible that the transmissions to be made in Canada will be similar in design to those for the Buick 40. If the management proceeds with the proposed program equipment expenditures probably will run up to \$500,000.

Ford has purchased hobbing and grinding machines to machine the teeth on its ring gears. Chevrolet still is buying machinery for its Flint plant, its purchases having been delayed by the Toledo strike. Chrysler is said to be considering the placing of orders to expand production of transmissions at the Dodge main plant and to increase

(CONTINUED ON PAGE 86)

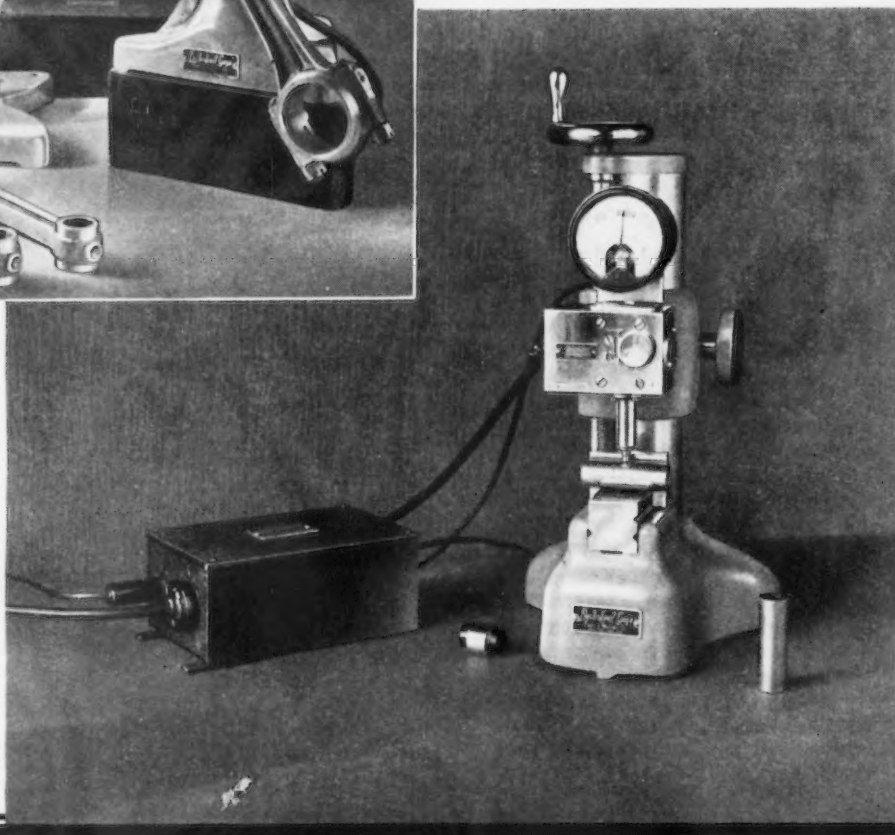


LEFT—The P&W Electrolimit Gage used as an Internal Comparator to check the Wrist Pin Holes in automotive connecting rods.



RIGHT—Inspecting Automotive Wrist Pins to "tenths" with a P&W Standard 4" Electrolimit External Comparator.

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THIS WEEK IN WASHINGTON

New Deal leaders attempt to stage recovery from staggering blow dealt by Supreme Court to NRA.

° ° °

President Roosevelt enveloped with gloom as he predicts return of "horse and buggy" days.

° ° °

State Department "advertises" foreign steel in statement announcing Swedish-American trade agreement.

° ° °

Important test cases of NRA authority are officially dropped by executive order.

° ° °

Organized labor still presses for passage of Wagner, 30-hr. week and Guffey bills despite their doubtful constitutionality.

BY L. W. MOFFETT

*Resident Washington Editor,
The Iron Age*

° ° °

WASHINGTON, June 3. — Rocked to its foundation by the devastating Supreme Court NRA decision, the New Deal was left in a state that was worse than groggy. . . . It was completely demoralized. . . . It took but little imagination for the fancy to detect a blast of the trumpet from Gabriel over the White House. . . . As a symbol of mourning Congress marked time for several days, though hard-boiled politicians say it was recessed by Administration leaders in order to escape withering jibes. . . . An immediate frontal attack from the Republican side clearly was ready to be launched, and the New Dealers wanted to rally their forces, regain their breath and restore equanimity so far as possible before meeting the inevitable onslaught. . . . Likewise they gathered in clusters at informal meetings, in committees, at the White House and elsewhere to exchange views and determine the force of the blow and decide what part of the stricken house of cards in the New Deal deck might be salvaged. . . .

Although masking the crushing defeat in smiles, New Dealers were wounded to the quick. . . . Some concealed but poorly the resentment they felt toward the highest tribunal of the land. . . . And no doubt in their ranks are those who would abolish the Court if they could have their way . . . yet public

respect for this great anchor of constitutional authority restrained open apoplectic outbursts. . . . Particularly when the decision was unanimous and the supplemental concurring opinion, even stronger if possible than the main opinion, was handed down by two members of the court who are listed among the "progressives," Justice Cardozo and Justice Stone. . . . No chance here of raising the dull cry of tory. . . . It was, as Administration forces had previously declared, a supreme test of the validity of NRA. . . .

Had Held Case Important

Gleefully, the over-enthusiastic head of NIRB, Donald R. Richberg, had told the press that the United States Circuit Court of Appeals for the Second Circuit had upheld NRA "all across the board" in the Schechter Poultry Corp'n. case. . . . He mildly chided the press for giving the decision such small notice, which he compared with the headlines "blazoned" across its pages when court decisions were against NRA. . . . It was, said Mr. Rich-

berg, "ten times the most important NRA case" ever to come before the court . . . it was only on two counts that the Circuit Court of Appeals held against NRA. . . . These related to wages and hours, as though they were minor considerations. . . . As Justice Cardozo said, "To take from the code the provisions as to wages and the hours of labor is to destroy it altogether. . . . Wages and the hours of labor are essential features of the plan, its very bone and sinew." . . .

Mr. Richberg obviously was aware of the importance of these provisions . . . indeed it was by reason of them that he was anxious to go to the Supreme Court in the Schechter case, preferring it as a test to the Blecher lumber case on which the Government backed down. . . . For Mr. Richberg had in mind the fact that the court had held the poultry business was in interstate commerce. . . . He missed his shot on the dividing line drawn by the court. . . . Taking its usual realistic view of the constitution,

unperturbed by clamor from any source, the Supreme Court held that after poultry arrives at a point the business ceases to be interstate commerce. . . . And the much-interpreted commerce clause slams the door against Congressional power over intrastate commerce. . . . So Congress had delegated to the President power that Congress never had. . . . And it delegated powers it had which it had no right to delegate without giving to the President a specific guide. . . . This apparently would virtually mean a set of individual rules for each code, an utter impossibility. . . . So it was the bird in the "sick chicken case" as it is called by the indefatigable General Hugh S. Johnson, still fighting for NRA's life, which turned out to be the Blue Eagle. . . .

Some Adverse Opinion Expected

It is well known of course that New Deal lawyers, among them some of the formidable array of 200 in the NRA legal division, had anticipated an adverse decision by the Supreme Court. . . . But they never dreamed it would be so sweeping. . . . They had thought the Blue Eagle would be plucked, but were not prepared to see its throat slit. . . . And perhaps New Dealers were disappointed most of all because of the implication of the decision. . . . That is, that the emergency is over. . . . Which means that further appeals to the emotional reactions of the country probably will carry much less weight than heretofore. . . . And a lot of legislation with its inevitable outcropping of Federal bureaucracy has been put across in that manner. . . . In the parlance of bureaucracy, an emergency is never over. . . . On the contrary the lust for power is as eternal as hope in the human breast and all too often "emergency" bureaus become permanent bureaus. . . . The odd thing is that business and industry have so frequently tamely submitted to Governmental strait-jackets when they must have realized they would not be given court sanction. . . .

NRA Benefits

Benefits there have been under NRA, although overestimated by its supporters. . . . Fixing of wages and hours at decent levels, reducing if not entirely eliminating sweatshops, stabilizing markets, establishing fair trade practices are most commendable. . . . But even those achievements were only partially gained and only through artificial and impermanent means. . . . For NRA was breaking down of its own heavy cumbersome weight as it sought to regiment the

largest and most involved industrial machine of all times. . . . Hostility toward NRA was growing and was reflected within Congress even among Administration forces. . . . While perhaps unduly blamed for some of the mounting costs, it came in for a share of condemnation from the homes of the land for kiting costs of living to disproportionate levels with no like rise in income. . . . And the feeling grew that prices too often were pegged on the basis of a profit to the inefficient producer and struck down competitive forces. . . . It is also well known that wages and hours, stabilized markets and fair trade practices were steadily breaking down and that violations of NRA had become the rule rather than the exception. . . .

As to the outbreak of strikes and threats of strikes by labor organizations that are attempting to bully industry and to coerce Congress into enacting pet legislative measures, they are not new. . . . They probably have been a sort of a corollary to the Supreme Court decision, a sort of anti-climax, defiant to the constitution itself. . . . Yet strikes, threats of strikes, labor agitation and general turmoil have been the daily diet of the nation ever since NRA, with its Section 7-a, went into effect. . . .

Breaks in prices following the decision, too, no doubt, have been accentuated, but neither of these developments gives occasion for the alarm Administration forces appear to enjoy in spreading. . . .

Johnson Drafting New Bill

Any new NRA undoubtedly will be at least partially and perhaps wholly the work of former Administrator Johnson, one of the most important of the numberless Presidential conferees on NRA legislation. . . . Indeed the General rushed to the radio a few hours after conferring with the President and laid out a plan for another NRA child that he was sure would be given Supreme Court blessing if it were ever brought before it. . . .

The General likely would not be associated with the new NRA, if any. . . . For quietly some prominent members of Congress doubt that there will be a rebirth of this tumultuous alphabetical agency, which was the first experiment of the New Deal that was to hasten the country to recovery but still sees some 10,000,000 unemployed. . . . Yet the General's policies might be worked into any new setup. . . . And the General has said that the basing point system in the steel industry would be knocked out "by gradual accommodation to

the mill base." . . . He thus absorbs the idea of the Federal Trade Commission, which in the past he has berated unmercifully. . . . NRA and FTC have been at odds since the former grabbed FTC's trade practice work and were so hopelessly far apart on the basing point question that each submitted a separate report to the President.

Federal Trade Commission Hopeful

The Supreme Court had some nice things to say about FTC and its orderly procedure, its system of investigating and of making sure of the legality of its steps before entering into trade practice agreements with industry. . . . This has inspired the FTC with the hope that it will get sweet revenge by taking over NRA work. . . . And FTC is preparing itself in the event the manna falls into its lap. . . .

The FTC would have nothing to do with labor policies. . . . Nor do any of the labor boards set up by the New Deal function any more. . . . As a member of one of the boards said, "We're simply standing by to see what will happen." . . . The Supreme Court decision put the skids under them by indirection, for with wages and hours held to be intrastate, a Federal board has no jurisdiction. . . .

Opinions of Industrialists

Certainly there are leading industrialists who think the Supreme Court decision is most refreshing for the country. . . . General Motors, one of the largest employers of the country, shares this view. . . . Alfred P. Sloan, Jr., its president, regards the decision "as a vital step toward promoting a sane industrial recovery." . . . Owen D. Young, chairman, General Electric Co., also went on record in Washington last week as to the beneficial effects to be expected if Governmental experimentation is brought to an end . . . telling the Senate Banking subcommittee "to do nothing and to threaten nothing" if it wishes prosperity to return. Mr. Young opposed the Eccles banking bill, which has Presidential support. . . . He warned against radical measures among which he included the Eccles bill, which would take over increasing control of credit and currency, and said their enactment would retard economic recovery. . . . He told the committee Congress ought to adjourn and go home, and the country at large must have echoed the same view. . . . He said the problem is to get business to use the \$25,000,000,000 operating credits in banks, but that it would never do so while confidence is impaired. . . . The key to the whole situation, Mr. Young said, is business activity, "partic-

ularly in the field of durable goods where most of the unemployment now is. . . . As durable goods have to be financed on long time credit, that market is particularly sensitive to drastic changes or threats in our financial structure. . . . Business in durable goods has undoubtedly been reassured by the failure of the Patman (bonus) bill. Yet it is still apprehensive." . . .

Advertising Foreign Steel

To read the State Department's complacent announcement on the gratuitous duty reductions it has granted on high priced steel one would think the American industry made no such steel.

As a sample of State Department advertising of foreign steel, is the following which was culled from its statement accompanying the American-Swedish reciprocal agreement:

"High-grade iron and steel have for many decades been a specialty of Sweden. The imports of these high-grade products, made almost entirely by the wood charcoal reducing process, are wholly insignificant compared with the enormous domestic production of ordinary tonnage grades of iron and steel. The Swedish products sell on a prestige basis at prices higher than the most nearly corresponding grades of domestic iron and steel command."

President Outlines Plans for Greatly Modified NRA—Labor Board Omitted

WASHINGTON, June 4.—President Roosevelt late today announced legislative plans for a greatly curtailed NRA to continue only until April 1, 1936. It would be merely a skeleton of NRA as it existed before the recovery act was held unconstitutional by the Supreme Court. None of the code provisions for price protection, fair trade practices or employment conditions are provided in the new measure, which is ready for introduction in the House of Representatives.

It was also made known that the seven labor boards were knocked out by the decision. Among them is the National Steel Labor Relations Board. The President did not indicate whether or not he approved the Wagner labor disputes bill. Nevertheless, he said if it is enacted it would set up new tribunals which would substantially cover the functions heretofore exercised by the various boards mentioned.

The White House announcement of legislative plans for a greatly modified NRA was made following a two-hour conference the President held this afternoon with Administration members and leaders in congress. The NRA conference followed a meeting of the cabinet this morning. Secretary Perkins said that the cabinet meeting discussion was given over to social security legislation, the Wagner labor disputes bill and NRA.

The belief prevailed that the Wagner bill would be included in the Administration "must" program at the present session of congress. This view has been heightened by reason of the presence of Senator Wagner at the

NRA conference. Speaking of social security legislation, scheduled for early enactment at the present session, Miss Perkins insisted that it is constitutional because it is based on taxing power. She said it was not affected by the Supreme Court's NRA decision.

The two principal features characterizing the legislation outlined by the President: First, it proposed passage by the House of the Senate joint resolution sponsored by Senator Clark of Missouri extending the life of NRA, in modified form, until April 1, 1936. That portion of the joint resolution which in effect relates to codes will be made inoperative insofar as the old codes are concerned.

The other measure proposed, and which, like the first, is only a partial stop-gap, relates to Government contracts. The proposal is to authorize requirement in every Government purchase that all persons engaged in the production of supplies or in the carrying out of the contract shall be paid in accordance with minimum wage and maximum hour standards. No person under 16 years of age would be employed. The same rule would apply to the use of Government loans or grants to States, municipalities or other local Government agencies.

While the President estimated that probably not much over 1 per cent of the industrial production of the country is used in Government work, he said the Government feels it should take a practical and definite step to show its good faith in maintaining the larger objective sought by NRA.

The recommendation for extend-

ing NRA only until April 1, 1936, it was stated, is based on the desirability of maintaining a comparatively small staff in Washington and in the more important centers of the country in order to bring together and summarize the vast amount of information now in possession of NRA, relating to the actual results of code administration and to collect information in regard to the effects on industry, both employers and employees, of the abandonment by the Government of code enforcement or requirements.

In some quarters this announced purpose was held to mean that the Administration will seek through presentation of this information to convince the country as to the good results obtained under NRA in effectuating recovery and maintaining a sound economic structure. That done, it was viewed in some quarters, efforts may be made later to seek an amendment to the Constitution which would restore NRA largely to its old form, or to the degree that could be done under the Supreme Court decision.

Another reason for continuing a skeleton organization of NRA in Washington, it was stated by the President, is that such an organization will be useful in carrying out the proposed requirement that Government purchases and contracts be placed only with corporations or contractors who live up to certain minimum requirements. The President said it was not as yet decided who will head NRA during its "stop-gap" period. Nor was he decided whether it would be conducted by a board or a single administrator. Generally, the opinion prevailed in Washington that the organization as proposed will carry little, if any, appeal to industry. It was held that it would further lose whatever appeal it might otherwise carry by reason of the belief that the Administration has approved the Wagner labor disputes bill.

"It should not be assumed by any person that this proposed continuation of the National Recovery Administration, in skeletonized form, relates in any way to the enforcement of working conditions or unfair trade practices formerly existing under the codes," said the White House Announcement.

In the proposal to compel Government contractors to live up to established requirements as to minimum wages and maximum hours, the President said he believed it carries out a moral responsibility of the Federal Government and it is hoped that such action will be followed as largely as possible by private industry in every one of its branches.

Important Test Cases of NRA Authority Are Dropped by Executive Order

WASHINGTON, June 4.—The Presidential order of last Saturday wiping 411 cases from court dockets was a formal step taken as the result of the Supreme Court's NRA decision. Nevertheless, it emphasized the sweeping character of the decision. It also accentuated the mountainous proportions to which litigation had piled up under provisions of New Deal legislation. The vast bulk of the cases centered around Section 7-a of the recovery act and the provisions of codes as to wages and hours. The ensuing wholesale dismissal of the cases was a refreshing and wholesome source of relief to business and industry generally.

Among important cases formally wiped off the court dockets were those concerning the Weirton Steel Co.; the Houde Engineering Corp.; the Firestone Tire & Rubber Co.; the Goodrich Rubber Co.; Fred C. Perkins, York, Pa., battery manufacturer, and W. A. Belcher, Alabama lumberman.

The famous Weirton case, the first major test of the collective bargaining provision of Section 7-a, was decided early in March by Judge John P. Nields, at Wilmington, whose finding was a victory for the steel company. The Judge held that the employee representation plan is a proper agency for collective bargaining and that Section 7-a is unconstitutional. The Department of Justice recently announced the case would be appealed to the Supreme Court. There were doubts, however, that the appeal actually would be taken.

The equally famous Houde case was the first to test the validity of the majority rule as a principle for collective bargaining, the policy urged by the National Labor Relations Board, which sponsored the litigation through the Department of Justice. The lower court upheld the board and the Houde corporation filed an appeal to the Supreme Court.

Fred C. Perkins was thrown into jail for alleged violation of the wage provisions of the battery code.

Labor Cases Abandoned

Other cases which are automatically wiped out included orders issued by the National Steel Labor Relations Board for elections which had been demanded by the Amalgamated Association of Iron, Steel & Tin Workers, for

all the New Deal labor boards, along with the cases, have been swept into the discard. Numerous election orders had been issued by the board against steel companies but only a few had reached the courts for testing.

Foremost among them were orders for elections at the Duquesne, Pa., plant and at the McDonald, Ohio, mill of the Carnegie Steel Co. These cases were not taken to the court by the company. Rather they were taken to the United States Courts of Appeals at Philadelphia and Cincinnati respectively by employee representative groups at the affected plant

and mill. Subsequently, the board dismissed the Duquesne case when a row broke out within the Amalgamated ranks with the result that the Amalgamated lodge at Duquesne was suspended by President M. F. Tighe of the association.

The President brought the court proceedings to an end after receiving, under date of May 30, three days after the Supreme Court's NRA decision, a brief report saying that in view of the Schechter poultry decision, "it seems futile to proceed with such actions." The White House in issuing its order "liquidating" the defunct cases said that if it had not been for the Schechter decision, "these cases would have been pressed by the Government in order to obtain effective enforcement of the wage standards and fair trade practices set as the intention of the national recovery act."

Organized Labor Still Pressing for Passage of Wagner and Guffey Bills

WASHINGTON, June 4.—Organized labor is engaged in a campaign of widespread alarm over the effects the Supreme Court decision on NRA will have on wages and hours. It is pressing with renewed force for the Wagner labor disputes bill, the 30-hr. work week bill, and the Guffey coal nationalization bill.

The strike order of the United Mine Workers, announced to become effective June 17, was clearly a gesture of coercion to compel Congress to enact the Guffey bill. Doubt is expressed that organized labor, certainly not as a unit, is especially eager for the 30-hr. work bill, though its sponsors insist they will push it to passage.

But the Wagner bill, so obnoxious to industry, is said to be slated for passage. No statement has been forthcoming from the President as to his position toward the bill, but it was reported again last week that he will support it. This report was revived after a White House conference last Friday with Senators Wagner, LaFollette and Byrnes.

The Wagner bill recently passed the Senate by the overwhelming vote of 60 to 13. There is no doubt it could be passed by the House by a like ratio, and Chairman Connery of the House Committee on Labor has said he will ask for its early passage. His bill differs from that of Senator Wagner only in that

the former would establish a National Labor Relations Board in the Department of Labor, while the Wagner bill would make the board an independent body.

The support back of the Wagner bill in Congress is clearly large enough to insure its enactment even in the face of an improbable Presidential veto. The fact that the Wagner bill and other legislative proposals backed by organized labor are unconstitutional is well realized by their supporters and were emphasized by the NRA decision. But this fact is causing no special concern. The point made by these forces is that organized labor could gain strong headway in its plan of unionization of industry before the cases were actually tested in court. This, of course, omits consideration of the fact that industry, convinced of the unconstitutionality of such legislation, might resist its enforcement.

Congressional Adjournment Doubtful

Business and industry are not only disturbed by these developments, but also by the outlook for Congressional adjournment. It was the hope that Congress soon would close its doors and go home. But the President has told leaders that his "must" program must be enacted before Congress adjourns even if it takes until December. Doubt is expressed that the President literally would insist upon
(CONTINUED ON PAGE 106)

May Pig Iron Output Up Slightly

PRODUCTION of coke pig iron in May totaled 1,727,095 gross tons, compared with 1,663,475 tons in April.

The daily rate in May, at 55,713 tons, increased one-half per cent over the April rate of 55,449 tons.

There were 97 furnaces in blast on June 1, making iron at the rate of 54,465 tons a day, against the same number on May 1, making iron at the rate of 53,555 tons a day. Five furnaces were blown in during the month and five were blown out or banked. The Steel Corporation put in one furnace and banked one, independent steel companies blew in three and took two off blast, and merchant producers put in one and blew out or banked two furnaces.

Among the furnaces blown in are the following: One Cambria, Bethlehem Steel Co.; one Norton, American Rolling Mill Co.; one Zug, National Steel Corp.; one Fairfield, Tennessee Coal, Iron & Railroad Co., and one Woodward, Woodward Iron Co.

Furnaces blown out or banked include: One Aliquippa, Jones & Laughlin Steel Corp.; one Shenango, Shenango Furnace Co.; one Mingo, Carnegie Steel Co.; the furnace of the Jackson Iron & Steel Co., and one Madeline, Inland Steel Co.

Production by Districts and Coke Furnaces in Blast

Furnaces	Production (Gross Tons)		June 1		May 1	
	May (31 Days)	April (30 Days)	Number in Blast	Operating Rate, Tons a Day	Number in Blast	Operating Rate, Tons a Day
New York:						
Buffalo	115,647	106,617	6	3,730	6	3,555
Other New York and Mass.	5,850	5,230	1	190	1	175
Pennsylvania:						
Lehigh Valley	36,285	32,212	3	1,170	3	1,075
Schuylkill Valley	13,730	8,020	1	445	1	265
Susquehanna and Lebanon Valleys	11,765	11,415	1	380	1	380
Ferromanganese			0		0	
Pittsburgh District	315,698	283,935	18	9,845	18	10,275
Ferro. and Spiegel	8,358	9,153	1	155	2	305
Shenango Valley	25,343	35,507	1	685	2	1,185
Western Pennsylvania	37,232	23,397	2	1,330	1	530
Ferro. and Spiegel	6,037	6,080	1	195	1	205
Maryland	60,157	78,499	3	1,940	3	2,615
Wheeling District	142,159	131,407	6	3,950	7	3,900
Ohio:						
Mahoning Valley	171,153	182,199	8	5,520	8	5,180
Central and Northern	173,767	173,880	10	5,605	10	5,795
Southern	38,197	35,703	2	1,195	3	1,190
Illinois and Indiana	361,153	340,053	15	10,700	16	11,335
Mich. and Minn.	41,536	50,312	3	1,780	2	1,150
Colo., Mo. and Utah	21,379	17,921	2	690	2	595
The South:						
Virginia			0		0	
Ferro. and Spiegel	3,146	3,069	1	100	1	100
Kentucky	12,897	14,042	2	665	1	470
Alabama	125,606	114,824	10	4,195	8	3,275
Tennessee			0		0	
Total	1,727,095	1,663,475	97	54,465	97	53,555

Daily Average Production of Coke Pig Iron

	Gross Tons			
	1935	1934	1933	1932
January	47,656	39,201	18,348	31,380
February	57,448	45,131	19,798	33,251
March	57,098	52,243	17,484	31,201
April	55,449	57,561	20,787	28,430
May	55,713	65,900	28,621	25,276
June		64,338	42,166	20,935
½ year		54,134	24,536	28,412
July		39,510	57,821	18,461
August		34,012	59,142	17,115
September		29,935	50,742	19,753
October		30,679	43,754	20,800
November		31,898	36,174	21,042
December		33,149	38,131	17,615
Year		43,592	36,199	23,733

Production of Coke Pig Iron and Ferromanganese

	Gross Tons Pig Iron*		Ferromanganese†	
	1935	1934	1935	1934
January	1,477,336	1,215,226	10,048	11,703
February	1,608,552	1,263,673	12,288	10,818
March	1,770,028	1,619,534	17,762	17,605
April	1,663,475	1,726,851	18,302	15,418
May	1,727,095	2,042,896	17,541	10,001
June		1,930,133		10,097
½ year		9,798,313		75,642
July		1,224,826		10,188
August		1,054,382		8,733
September		898,043		7,100
October		951,062		9,830
November		956,940		8,134
December		1,027,622		4,563
Year		15,911,188		124,190

*These totals do not include charcoal pig iron. The 1933 production of this iron was 32,941 gross tons.

†Included in pig iron figures.

Merchant Iron Made, Daily Rate

	Tons			
	1935	1934	1933	1932
January	3,926	7,800	2,602	6,256
February	6,288	7,071	2,863	7,251
March	7,089	7,197	2,412	7,157
April	8,799	8,838	1,908	5,287
May	8,441	9,099	3,129	4,658
June		9,499	4,088	6,090
July		7,880	6,783	3,329
August		6,043	7,756	3,070
September		4,986	10,034	3,213
October		5,765	8,634	4,286
November		6,610	7,639	4,435
December		4,399	8,358	3,674

April Steel Exports Decline Sharply

WASHINGTON, June 4.—Exports declined to 205,336 gross tons in April from 323,035 in March, while imports rose to 28,786 tons from 21,409 tons. Of the drop of 117,701 tons in the export movement, 96,607 tons was accounted for in the decline of the scrap movement, which aggregated 131,731 tons in April as against the all-time peak movement of 228,338 tons in March. The principal sources of April scrap exports were Japan, 93,551 tons; United Kingdom, 17,581 tons; Italy, 8447 tons. Tin plate exports were 4849 tons; black steel sheets, 8471 tons, and ingots, blooms, billets, etc., 8283 tons.

Imports of pig iron in April were 8247 tons; ferromanganese and spiegeleisen, 5563 tons; structural shapes, 2228 tons; nails, tacks and staples, 2211 tons; barbed wire, 1813 tons; hoops and bands, 1491 tons; merchant steel bars, 1407 tons, and scrap, 1259 tons.

Current Metal Working Activity Statistically Shown

These Data Are Assembled By THE IRON AGE From Recognized Sources And Are Changed Regularly As More Recent Figures Are Made Available. Boldface Type Indicates Changes This Week

	April, 1935	March, 1935	April, 1934	Four Months, 1934	Four Months, 1935
Raw Materials:					
Lake ore consumption (gross tons) ^a	2,356,391	2,582,986	2,470,121	8,043,736	9,676,171
Coke production (net tons) ^b	2,736,723	3,012,692	2,947,051	11,283,303	11,512,399
Pig Iron:					
Pig iron output—monthly (gross tons) ^a	1,663,475	1,770,028	1,726,851	5,825,284	6,519,391
Pig iron output—daily (gross tons) ^a	55,449	57,098	57,561	48,544	54,328
Castings:					
Malleable castings—production (net tons) ^d	42,035	42,808	40,742	148,536	169,620
Malleable castings—orders (net tons) ^d	37,394	40,237	38,453	150,509	163,424
Steel castings—production (net tons) ^d	31,932	31,940	46,242	141,903	122,614
Steel castings—orders (net tons) ^d	29,233	30,723	63,142	185,182	123,030
Steel Ingots:					
Steel ingot production—monthly (gross tons) ^a ..	2,606,311	2,830,700	2,897,529	9,813,314	11,013,306
Steel ingot production—daily (gross tons) ^a	100,243	108,873	115,901	95,517	106,906
Steel ingot production—per cent of capacity ^a ..	45.28	49.18	52.64	44.54	48.30
Employment in Steel Industry:					
Total employees ^a	424,623	425,189	431,086	411,668	419,320
Total payrolls (thousands of dollars) ^a	45,890	46,764	45,472	157,038	181,196
Average hours worked per week ^a	34.2	33.9	34.4	32.9	34.3
Finished Steel:					
Trackwork shipments (net tons) ^a	4,399	3,440	6,132	16,699	13,064
Sheet steel sales (net tons) ^e	168,093	193,057	272,412	824,474	866,303
Sheet steel production (net tons) ^e	209,219	227,082	214,522	793,256	891,077
Fabricated shape orders (net tons) ^a	91,228	99,327	121,552	393,977	321,786
Fabricated shape shipments (net tons) ^e	81,271	82,410	82,194	253,054	315,266
Fabricated plate orders (net tons) ^d.....	.....	16,832	20,085	89,547	.....
Reinforcing bar awards (net tons) ^e	30,490	17,335	22,685	73,985	85,690
U. S. Steel Corp'n. shipments (tons) ^b	591,728	668,056	643,009	1,948,495	2,376,976
Ohio River steel shipments (net tons) ⁱ	57,825	75,072	72,974	179,353	249,922
Fabricated Products:					
Automobile production, U. S. and Canada ^k	501,837	451,809	378,983	1,125,349	1,610,883
Construction contracts, 37 Eastern States ^l	\$124,098,000	\$122,940,500	\$131,157,000	\$592,682,800	\$421,962,500
Steel barrel shipments (number) ^d	610,848	525,022	658,216	2,640,579	1,977,132
Steel furniture shipments (dollars) ^d	\$1,122,987	\$1,220,533	\$934,097	\$4,074,412	\$4,547,236
Steel boiler orders (sq. ft.) ^d	312,542	655,812	440,562	1,115,729	1,641,784
Locomotive orders (number) ^m	2	8	40	63	11
Freight car orders (number) ^m	600	0	750	21,649	1,430
Machine tool index ⁿ	65.6	62.3	46.5	†48.5	†60.3
Foundry equipment index ^o	113.2	69.3	67.9	†67.7	†86.0
Foreign Trade:					
Total iron and steel imports (gross tons) ^p	28,786	21,409	26,862	113,315	101,884
Imports of pig iron (gross tons) ^p	8,247	2,708	8,253	51,590	23,756
Imports of all rolled steel (gross tons) ^p	12,124	11,355	9,184	29,645	52,913
Total iron and steel exports (gross tons) ^p	205,336	323,035	201,539	792,015	1,019,648
Exports of all rolled steel (gross tons) ^p	65,683	78,483	71,882	314,442	284,891
Exports of finished steel (gross tons) ^p	55,092	68,146	68,785	296,179	248,908
Exports of scrap (gross tons) ^p	131,731	232,967	126,687	463,008	707,142
British Production:					
British pig iron production (gross tons) ^r	526,300	553,200	496,300	1,855,600	2,083,800
British steel ingot production (gross tons) ^r	808,700	841,900	716,800	2,969,800	3,177,900
Non-Ferrous Metals:					
Lead production (net tons) ^a	32,389	32,558	32,113	140,534	121,756
Lead shipments (net tons) ^a	40,922	28,960	30,673	120,683	136,100
Zinc production (net tons) ^a	35,334	36,667	30,686	127,904	140,713
Zinc shipments (net tons) ^a	38,460	41,137	32,072	124,090	150,038
Deliveries of tin (gross tons) ^v	5,025	5,495	4,405	14,490	19,025

*Preliminary. †Three Months' Average.

Sources of figures: ^a Lake Superior Iron Ore Association; ^b Bureau of Mines; ^c THE IRON AGE; ^d Bureau of the Census; ^e American Iron and Steel Institute; ^f National Association of Flat-Rolled Steel Manufacturers; ^g American Institute of Steel Construction; ^h United States Steel Corp'n.; ⁱ United States Engineer, Pittsburgh; ^j When preliminary, from Automobile Manufacturers Association—Final figures from Bureau of the Census; ^k F. W. Dodge Corp'n.; ^l Railway Age; ^m National Machine Tool Builders Association; ⁿ Foundry Equipment Manufacturers Association; ^o Department of Commerce; ^p British Iron and Steel Federation; ^q American Bureau of Metal Statistics; ^r American Zinc Institute, Inc.; ^s New York Commodities Exchange.

SUMMARY OF THIS WEEK'S BUSINESS

Steel Market Stabilizes After First Reaction to Code Abandonment

Bookings Show Little More Than Seasonal Dip and Production Is Off But One Point to 41½ Per Cent—Pig Iron Output Up in May

PIG IRON production in May totaled 1,727,095 tons, or 55,713 tons a day, compared with 1,663,475 tons, or 55,449 tons daily, in April. The gain in daily rate was one-half of 1 per cent. The number of active furnaces on June 1 was 97, unchanged from one month previous.

ALTHOUGH iron and steel demand was adversely affected last week by the sudden end of the NRA and the interposition of a holiday, the recession in bookings was smaller than might have been expected. Buying, which has been on a short-term basis for some time, has shown little more than a seasonal dip. Hesitancy on the part of consumers is reflected principally in unwillingness to make commitments for the third quarter, pending clarification as to the trend of prices. Scattered long-term inquiries, some of them calling for deliveries until the end of the year, have been put out to test the market, but to date pressure for lower prices has not been severe and existing quotations have held without a break.

Though confusion was the first result of the sudden termination of code control, calm was restored rather quickly. As a consequence initial estimates of steel production for the current week were too conservative, and late returns to THE IRON AGE indicate that the national average has declined only one point to 41½ per cent of capacity. At Pittsburgh and in the Valleys, operations are off two points to 34 per cent and 48 per cent respectively. In the Wheeling district there has been a further drop of five points to 63 per cent. Elsewhere production is holding its own.

A revival of confidence is also evident in the ever-sensitive scrap market. Though the nervousness which became apparent a week ago has not entirely subsided, prices are holding in all centers and THE IRON AGE composite for heavy melting scrap remains unchanged at \$10.83 a gross ton.

THE spontaneity with which leaders of the iron and steel industry promised maintenance of existing wage standards, first individually and then collectively by Institute resolution, augurs well for a continuance of stability rather than an early upset of present market levels. The entire trade, including many consumers as well as producers, realizes that rewon freedom from bureaucratic interference implies increased responsibility. It is well understood that widespread price cuts would immediately threaten wage rates and invite a return of legislative and administrative meddling with industrial relations.

Not that present market levels will remain fixed. On the contrary, the passing of the code will inevitably make for greater flexibility. Even now there are indications that in the case of certain products allowances may be made on quantity orders on the score that they are more economical to roll. Resale agreements, which were indifferently observed even under the code, may pass out entirely or undergo marked modification. A number of competitive standards which have been the subject of sharp controversy, for example, Code Regulations 9 governing fabrication in transit, may be materially altered. But the industry is counting on the spirit of interdependence, cultivated under code control, to protect it from anything resembling price demoralization.

Further reason for caution in disturbing prices is provided by the threat of a bituminous coal strike on June 16. There has been brisk anticipatory buying of coal, and beehive coke producers, despite the passing of code control, are adhering firmly to recent prices.

AGRICULTURAL implement plants, despite a seasonal changeover to different types of equipment, continue to take steel at an undiminished rate. Demand from the automobile industry, on the other hand, is undergoing expected curtailment. The Government's works relief program, according to present indications, has been delayed at least a month by uncertainties growing out of the Schechter decision.

Structural steel awards of 5700 tons compare with 6250 tons in the previous week. Plate lettings total 5600 tons.

The Grand Trunk Western has bought 8450 tons of rails, the Texas & Pacific 7700 tons, and the Canadian Pacific 7000 tons. The Chesapeake & Ohio is in the market for 5175 freight cars and five locomotives.

Further reductions in iron and steel duties, announced in connection with the Swedish trade agreement, reflect a disregard for foreign threats to American wage standards that contrasts sharply with apparent alarm over possible wage slashes by domestic manufacturers released from code control. Rolled steel imports in April totaled 12,124 tons, compared with 13,292 tons in March. Exports of all rolled steel were 65,683 tons, against 78,483 tons in the previous month. Exports of finished steel were 55,092 tons, compared with 68,146 tons.

THE IRON AGE composite price for pig iron, owing to an adjustment for intrastate freight surcharges in Ohio, has advanced from \$17.83 to \$17.84 a ton. The finished steel composite is unchanged at 2.124c. a lb.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

	June 4, 1935	May 28, 1935	May 7, 1935	June 5, 1934
<i>Per Gross Ton:</i>				
No. 2 fdy., Philadelphia.....	\$20.3132	\$20.3132	\$20.26	\$20.26
No. 2, Valley furnace.....	18.50	18.50	18.50	18.50
No. 2 Southern, Cin'ti.....	19.2007	19.13	19.13	19.13
No. 2, Birmingham†.....	14.50	14.50	14.50	14.50
No. 2 foundry, Chicago*.....	18.50	18.50	18.50	18.50
Basic, del'd eastern Pa.....	19.8132	19.8132	19.76	19.76
Basic, Valley furnace.....	18.00	18.00	18.00	18.00
Malleable, Chicago*.....	18.50	18.50	18.50	18.50
Malleable, Valley.....	18.50	18.50	18.50	18.50
L. S. charcoal, Chicago.....	24.2528	24.2528	24.2528	24.04
Ferromanganese, seab'd car-lots	85.00	85.00	85.00	85.00

†This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Finished Steel

	June 4, 1935	May 28, 1935	May 7, 1935	June 5, 1934
<i>Per Lb. to Large Buyers:</i>				
Hot-rolled annealed sheets, No. 24, Pittsburgh.....	2.40	2.40	2.40	2.65
Hot-rolled annealed sheets, No. 24, Gary.....	2.50	2.50	2.50	2.75
Sheets, galv., No. 24, P'gh..	3.10	3.10	3.10	3.25
Sheets, galv., No. 24, Gary..	3.20	3.20	3.20	3.35
Hot-rolled sheets, No. 10, P'gh	1.85	1.85	1.85	2.00
Hot-rolled sheets, No. 10, Gary	1.95	1.95	1.95	2.10
Wire nails, Pittsburgh.....	2.60	2.60	2.60	2.60
Wire nails, Chicago dist. mill	2.65	2.65	2.65	2.65
Plain wire, Pittsburgh.....	2.30	2.30	2.30	2.30
Plain wire, Chicago dist. mill	2.35	2.35	2.35	2.35
Barbed wire, galv., P'gh.....	3.00	3.00	3.00	3.00
Barbed wire, galv., Chicago dist. mill.....	3.05	3.05	3.05	3.05
Tin plate, 100 lb. box, P'gh..	\$5.25	\$5.25	\$5.25	\$5.25

Scrap

<i>Per Gross Ton:</i>				
Heavy melting steel, P'gh..	\$11.75	\$11.75	\$11.50	\$11.75
Heavy melting steel, Phila..	10.50	10.50	10.25	10.50
Heavy melting steel, Ch'go..	10.25	10.25	10.00	9.75
Carwheels, Chicago.....	10.50	10.50	10.50	9.75
Carwheels, Philadelphia.....	11.25	11.25	11.25	12.50
No. 1 cast, Pittsburgh.....	13.25	13.25	12.75	12.25
No. 1 cast, Philadelphia.....	11.25	11.25	11.25	12.25
No. 1 cast, Ch'go (net ton)...	9.00	9.00	9.00	7.50
No. 1 RR. wrot., Phila.....	10.25	10.25	10.25	12.25
No. 1 RR. wrot., Ch'go (net)	8.00	8.00	8.00	7.50

Rails, Billets, etc.

<i>Per Gross Ton:</i>				
Rails, heavy, at mill.....	\$36.37 1/2	\$36.37 1/2	\$36.37 1/2	\$36.37 1/2
Light rails, Pittsburgh.....	35.00	35.00	35.00	35.00
Re-rolling billets, Pittsburgh	27.00	27.00	27.00	29.00
Sheet bars, Pittsburgh.....	28.00	28.00	28.00	30.00
Slabs, Pittsburgh.....	27.00	27.00	27.00	29.00
Forging billets, Pittsburgh	32.00	32.00	32.00	34.00
Wire rods, Pittsburgh.....	38.00	38.00	38.00	38.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb..	1.70	1.70	1.70	1.70

Coke, Connellsville

<i>Per Net Ton at Oven:</i>				
Furnace coke, prompt.....	\$3.85	\$3.85	\$3.85	\$3.85
Foundry coke, prompt.....	4.60	4.60	4.60	4.60

Finished Steel

<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.80	1.80	1.80	1.90
Bars, Chicago.....	1.85	1.85	1.85	1.95
Bars, Cleveland.....	1.85	1.85	1.85	1.95
Bars, New York.....	2.15	2.15	2.15	2.25
Plates, Pittsburgh.....	1.80	1.80	1.80	1.85
Plates, Chicago.....	1.85	1.85	1.85	1.90
Plates, New York.....	2.09	2.09	2.09	2.15
Structural shapes, Pittsburgh	1.80	1.80	1.80	1.85
Structural shapes, Chicago..	1.85	1.85	1.85	1.90
Structural shapes, New York	2.06 1/4	2.06 1/4	2.06 1/4	2.10 1/4
Cold-finished bars, Pittsburgh	1.95	1.95	1.95	2.10
Hot-rolled strips, Pittsburgh	1.85	1.85	1.85	2.00
Cold-rolled strips, Pittsburgh	2.60	2.60	2.60	2.80

Metals

<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents
Electrolytic copper, refinery..	8.75	8.75	8.75	8.25
Lake copper, New York.....	9.12 1/2	9.12 1/2	9.12 1/2	8.62 1/2
Tin (Straits), New York.....	51.00	51.75	50.50	51.45
Zinc, East St. Louis.....	4.30	4.30	4.20	4.25
Zinc, New York.....	4.67 1/2	4.67 1/2	4.57 1/2	4.60
Lead, St. Louis.....	3.95	4.20	3.60	3.85
Lead, New York.....	4.10	4.35	3.75	4.00
Antimony (Asiatic), N. Y....	12.75	12.75	14.25	8.25

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

Finished Steel

June 4, 1935	2.124c. a Lb.
One week ago	2.124c.
One month ago	2.124c.
One year ago	2.199c.

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.

Pig Iron

\$17.84 a Gross Ton
17.83
17.90
17.90

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap

\$10.83 a Gross Ton
10.83
10.58
10.67

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	HIGH	LOW	HIGH	LOW	HIGH	LOW
1935	2.124c., Jan. 3;	2.124c., Jan. 8	\$17.90, Jan. 8;	\$17.83, May 14	\$12.33, Jan. 8;	\$10.33, April 23
1934	2.199c., April 24;	2.008c., Jan. 2	17.90, May 1;	16.90, Jan. 27	13.00, Mar. 13;	9.50, Sept. 25
1933	2.015c., Oct. 3;	1.867c., April 18	16.90, Dec. 5;	13.56, Jan. 3	12.25, Aug. 8;	6.75, Jan. 3
1932	1.977c., Oct. 4;	1.926c., Feb. 2	14.81, Jan. 5;	13.56, Dec. 6	8.50, Jan. 12;	6.43, July 5
1931	2.037c., Jan. 13;	1.945c., Dec. 29	15.90, Jan. 6;	14.79, Dec. 15	11.33, Jan. 6;	8.50, Dec. 29
1930	2.273c., Jan. 7;	2.018c., Dec. 9	18.21, Jan. 7;	15.90, Dec. 16	15.00, Feb. 18;	11.25, Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14;	18.21, Dec. 17	17.58, Jan. 29;	14.08, Dec. 3
1928	2.286c., Dec. 11;	2.217c., July 17	18.59, Nov. 27;	17.04, July 24	16.50, Dec. 31;	13.08, July 22
1927	2.402c., Jan. 4;	2.212c., Nov. 1	19.71, Jan. 4;	17.54, Nov. 1	15.25, Jan. 11;	13.08, Nov. 22

Production Dips in Pittsburgh, Valley and Wheeling Areas



Spot Buying Remains in Fair Aggregate Volume—Coal Strike Looms as a New Threat to Business

PITTSBURGH, June 4.—Raw steel output in the Pittsburgh district has dropped two points this week to 34 per cent of capacity, representing the first decline since the week of March 18 and the lowest weekly rate since the week of Jan. 14.

Lower steel output is readily traceable to several influences. The primary check to activity is the uncertainty that has persisted since the overthrow of the iron and steel code. The passing of seasonal peaks in demand for tin plate and automobile steel also is a retarding influence. Another unfavorable turn is the prospective delay of at least a month in the actual launching of the Government's huge work relief program, which is partly stymied by the Supreme Court's decision against the NIRA.

The impending bituminous coal strike, which has been partly eclipsed by recent events affecting the NIRA, now looms as a serious threat to steel activity unless legislation regulating the soft coal industry is enacted by June 16.

Regardless of these unfavorable influences, a fair amount of miscellaneous spot buying of steel continues, although a generally cautious attitude among consumers is clearly discernible. Producers in this district are concerted in their intention to maintain base quotations and to apply full extras for the time being. Only rare instances have been reported of pressure from consumers for lower prices since the code became non-existent.

No marked revisions in finishing mill schedules have been made. Sheet mill output this week is moderately lower at 50 to 55 per cent. Tin plate production is down about five points to 75 to 80 per cent, while hot-rolled strip production is slightly lower at 40 to 45 per cent.

Ingot production in the Valleys and nearby northern Ohio mills has slipped two points to 48 per cent, while in the Wheeling district output is five points lower at 63 per cent.

Pig Iron

Producers in this district are adhering to base quotations on all grades, and for the present expect to make no changes in prices despite the passing of the code. With a large share of pig iron business in this area being transacted on a reciprocal basis, pressure for lower prices, which might normally be expected, is entirely lacking. Demand has reflected little change, with small-lot buying characteristic of the market. The opening of books for third quarter on June 1 thus far has failed to bring in forward tonnage.

Semi-Finished Steel

Non-integrated mills are taking shipments on contracts, but new buying reflects a generally cautious attitude. Large producers who supply detached mills in this district report no pressure thus far for lower prices. Continued decline of tin plate production has further reduced the movement of sheet bars, while a similar trend in automotive demand is affecting the movement of forging stock.

Bolts, Nuts and Rivets

Contracting for third quarter has made no headway since the opening of books last week. Most producers here report that May tonnage ran lighter than that in April and that prospects for June foreshadow no improvement. Prices are fairly well maintained in this area, but weakness in other districts has not entirely disappeared.

Plates and Shapes

The Gulf Refining Co., Pittsburgh, has readvertised for bids on two steel barges, 130 ft. x 32 ft. x 7 ft., which will require about 300 tons of plates and shapes. The barge market still is comparatively active, although orders are slow to mature because of difficulty in setting up financial arrangements. Prospects for heavier demand from railroad equipment makers are brighter.

The Jones & Laughlin Steel Corp. has been awarded 2000 tons of structural steel for a dental

school building at Louisiana State University, New Orleans. Additional projects in the Muskingum Valley Conservancy district are appearing, with 2100 tons required for 11 railroad bridges.

The plate and shape market has remained unperturbed since the overthrow of the code. Base prices for plain material are being rigidly observed.

Reinforcing Steel

Inquiries for public works projects are appearing more frequently. In the Pittsburgh district, the Allegheny County Authority work will soon result in a fairly substantial flow of reinforcing material, while important State road work will begin to mature this month. Private work still is scarce. It is the intention of reinforcing steel producers to maintain current base prices.

Cold-Finished Bars

While new buying has diminished since the overthrow of the steel code, shipments are moving regularly on contracts. The consuming trade evidently is marking time until the confusion growing out of the sudden end of the NIRA has lessened. Orders for small lots continue to drift in and indicate that stocks, with the possible exception of those at automotive centers, are at a low point. Buying for third quarter has not started. Prices are being rigidly maintained.

Tubular Products

The steadiness of this market has not been shaken by the Supreme Court's decision against the code, and demand continues in sustained volume. Oil country goods continue to lead in the movement of tubular goods. Increased home building is accounting for a better flow of standard pipe. Railroads are buying occasional car lots of boiler tubes and locomotive tubes. Boiler tubes for industrial replacement work are not so active. Shipments of mechanical tubing to the automotive industry are lighter.

Bars

No requests for deferred shipments on contracts are reported since the code's passing, but new buying reflects a general policy among consumers to limit purchases to immediate imperative requirements. Aggregate volume for May reported by some producers exceeded April business by an impressive margin. Tapering in automotive demand for June requirements foreshadows a less favorable record this month. Current base prices for soft steel bars and alloy steel bars are holding firmly, and no changes are immediately in prospect. Despite the movement



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earlier in second quarter among cold-finished producers for a lower hot-rolled bar price, pressure from that group since the code became non-existent has been absent.

Wire Products

New business is not holding to the recent pace, although shipments are being taken in accordance with contract provisions. The ending of the code has created hesitancy among wire consumers, who evidently are awaiting a definite clarification of present uncertainties, with particular regard to prices. All current wire quotations are holding and it is considered unlikely that deviations from the current base quotations will be uncovered.

Sheets

While this market has remained surprisingly steady since the iron and steel code's demise, consumer demand has tended downward. There has been some shopping in the trade for price concessions, but thus far producers remain adamant in their position on prices. For the time being, at least, the general policy will be to maintain all base quotations and apply full extras to all transactions. Demand from the automotive industry is gradually receding, while miscellaneous interest is a shade lighter. Mill schedules in the current week will average moderately lower, at 50 to 55 per cent. About 1200 tons of carbon steel sheets will be needed for 250 subway cars inquired for by the Board of Transportation, New York, on which the Pressed Steel Car Co. is reported to be low bidder.

Tin Plate

Cumbersome stocks at some plants which have been producing against specifications for later shipment are slowing production. For some weeks shipments have been running behind output, and the general aim is to obtain release for stocks that have been accumulating. Average production for the tin plate industry this week has been scaled down about five points to 75 to 80 per cent. It is believed that the peak demand for the season has been reached and that production will continue to decline gradually.

Strip Steel

Volume of spot buying is sustained, while forward covering has practically ceased since the important national developments of last week. Backlogs are diminishing in the absence of any heavy forward buying, and rolling schedules this week likely will be revised downward. Hot-rolled strip production is estimated at 40 to 45 per cent. Consumers evidently are awaiting

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assurance of sustained strip prices before again ordering freely. No open pressure for lower quotations has been in evidence in this district.

Coke and Coal

The growing belief that a bituminous coal strike is inevitable unless the Guffey bill is passed in some revised form by June 16 has stimulated a fairly brisk buying movement in anticipation of a shutdown. With the Southern operators quite generally alined against the Guffey bill, any early solution that might forestall a shutdown on June 16 seems unlikely. The heavier buying has temporarily steadied bituminous coal prices, which prior to the ending of codes were notably spotty. Regardless of the passing of codes, beehive coke producers intend to maintain current prices. Foundry and furnace grades are relatively quiet.

Scrap

Uncertainty still enshrouds this market and activity has dwindled to minor dealer transactions. One or two mills are quietly testing the market for prices, but important buying is not believed in the making. Lower ingot output in this district in the current week has dampened sentiment and, while prices have not yielded, scrap is becoming more readily available at current quotations. High grade railroad scrap still commands a substantial premium over ordinary yard material. The Pennsylvania Railroad scrap list, which closes on June 5, covers 18,900 tons, including 7950 tons of No. 1 heavy melting steel.

Output Sustained At Buffalo

BUFFALO, June 4.—Nine open-hearths continue in operation at the Lackawanna plant of the Bethlehem Steel Corp'n. Republic Steel Corp'n. is still running five furnaces and Wickwire-Spencer Steel Corp'n., one. The Seneca sheet division of Bethlehem is operating at 70 per cent.

A local plant will fabricate 200 tons of structural steel for a factory building for the Peter Cailler Kohler Swiss Chocolate Co., Inc., at Fulton, N. Y. The 500-ton Syracuse station job and the 1000-ton Olean high school project are still pending. The city of Buffalo has advertised for bids for 3000 tons of plates to be used in the construction of elevated tanks for the water department. There will be three tanks, each with a 2,000,000-gal. capacity. A bridge in Hornell will require 125 tons of steel.

A local mill has purchased about



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3000 tons of No. 1 and No. 2 heavy melting steel at \$11 and \$10 respectively. The market shows evidence of confusion following the elimination of the NRA codes, and both consumer and seller are marking time. The demand for scrap from Italy and Japan is even greater than last year, dealers report.

Pig iron business is quiet, with few large orders moving.

Reinforcing Steel

Awards 2455 Tons—New Projects
3750 Tons

AWARDS

Cleveland, 350 tons, Easterly sewage disposal plant, to Patterson-Leitch Co.

State of Illinois, 200 tons, road work, to unnamed bidders.

Waukegan, Ill., 1000 tons, sewage plant, to Concrete Steel Co.

Fresno, Cal., 317 tons, Hall of Records building, to Pacific Coast Steel Corp'n.

Santa Clara County, Cal., 117 tons, Coyote dam and spillway, to an unnamed bidder.

State of California, 112 tons, highway work in five counties, to unnamed bidders.

San Francisco, 350 tons joists, Trans-Bay bridge distribution structure, to Pacific Coast Steel Corp'n.

NEW REINFORCING BAR PROJECTS

New York, 200 tons, foundations for Bronx-Kills spans of Tri-Borough Bridge; Tully & Dinapoli low on general contract.

Zanesville, Ohio, 575 tons, Pleasant Hill dam in Muskingum District Conservancy project; bids June 13.

Zanesville, 250 tons, Atwood dam in Muskingum District Conservancy project; bids June 12.

Zanesville, 113 tons, Leesville dam in connection with Muskingum District Conservancy project; Culbertson Construction Co., Cleveland, low bidder.

Zanesville, 367 tons, relocation of Pennsylvania, Wheeling & Lake Erie and Baltimore & Ohio Railroad tracks; bids to be taken June 14 to June 20.

Columbus, 500 tons, Main Street bridge; general contract awarded to General Asphalt Paving Co., Canton, Ohio.

Cleveland, 270 tons, administration building for Easterly sewage disposal plant; J. L. Hunting Co., Cleveland, low bidder for general contract.

Kansas City, Mo., 1000 tons, school building.

Jacksonville, Ill., tonnage being estimated, State tuberculosis hospital.

Albrecht, Ill., 650 tons, bridge; materials Service Corp'n. general contractor.

State of Missouri, 122 tons, highway bridges; bids to be opened June 8.

Camarillo, Cal., 200 tons, attendants' quarters at State hospital; bids open.

Los Angeles, 100 tons, warehouse and office building; bids June 6.

Seattle, 150 tons, women's dormitory at University of Washington; bids June 18.

Republic's Canton Plant Again Active

THE Republic Steel Corp'n.'s plant in Canton, Ohio, resumed operations Monday after a short strike precipitated by a few rank and file radicals formerly affiliated with the Amalgamated Association of Iron, Steel and Tin Workers in the Berger plant, which spread to the Stark rolling mill and United Alloy divisions. Employees of the latter two plants voted 2733 to return to work and 164 to continue the strike.

Chicago Output Holds At 43½ Per Cent



Mills Voluntarily Adhere to Code Standards—Quality Discounts May Be Recognized in Wire Trade

CHICAGO, June 4.—Ingot output remains at 43½ per cent of capacity, and on the whole the market seems to be undisturbed in any major way by the ruling on NRA. The practice of close buying was adopted weeks ago and the dwindling of specifications from automobile plants is not new within the last 10 days. Meetings are being held to wind up code affairs, but there is strong disposition to hold to code standards. There seems to be no disposition to disturb wage scales, but rather to view present costs as more or less fixed and on that score to hold price structures as the most practicable means of striving for profits.

Sales practices are unaltered, though the wire industry is inclined openly to recognize quantity discounts, which subject was under discussion prior to the Supreme Court's decision.

The matter of whether or not all mills will adhere to the code

basing point system is in question. The answer will soon be found in quotations that are now coming out. Outstanding in prospective business is the 65,000 to 80,000 tons of rolled steel that will be used for the 5125 cars to be purchased by the Chesapeake & Ohio. This road will also buy 20 locomotives. The Canadian Pacific will order 600 freight cars and the Chicago Surface Lines contemplate buying 100 new street cars. Structural specifications hold at a fair level, but inquiries are light and awards total less than 500 tons.

The strike at the Case plant at Racine, Wis., has been terminated.

Fig Iron

Shipments remain steady, but new buying that sellers had hoped would develop about June 1 has not made its appearance. Buyers are inclined to await developments and there is a surprising absence of pressure for lower prices. Sellers of pig iron are holding price levels,

and sales policies as established under the code are being extended.

Cast Iron Pipe

The highlight of the market is moderate buying by industrial plants which have long been on the dormant list. Current business, however, involves only small tonnages and there are fewer of them than early in May. All prices remain steady, but sellers are studying all Government moves for clues as to the ultimate effects of the court ruling on NRA. It is thought by some that Federal plans will move more slowly for a time. This will affect the cast-iron pipe business because by far the bulk of tonnage has been coming from Government expenditures.

Reinforcing Bars

All current orders are small but they are in such volume that estimating and drafting departments are busy. The most attractive inquiry is for 1000 tons for a school at Kansas City, Kan. Dealers are carefully scrutinizing the probable effects of the ruling against NRA. For some time there have been rumblings that prices as well as some fair trade practices were not being adhered to. It is anybody's guess as to what will become of the trade practice rules. As to prices, some dealers feel that mills will be so anxious to hold present quotations that their attitude will tend to influence dealers, and that possibly price structures may be more solid without than with NRA.

Wire Products

Orders for wire and wire products turned upward last week in a movement that is contrary to expectations at the end of May. It was also unexpected in view of the death of NRA, inasmuch as some had expected that the confusion resulting from the elimination of the code would hold business in check. The fall terms announced a week ago on woven wire fencing had little to do with the increase in tonnage, but orders resulting from this move are expected to flow in freely from now on. Wire producers are matching cost against selling price and are anxious to hold current price structures, with the exception that quantity buyers will be recognized, but prices to them will be in the open. In general, sales practices established under the code are being retained. Mill stocks are still low and in all probability will remain so, because producers hope in that way to spread employment as far as possible.

Structural Material

Awards have dropped to the unusually low total of less than 500

SAW Large and Deep Holes on Small Drill Presses with

MARVEL High-Speed-Edge HOLE SAWS

MARVEL HOLE SAWS differ from all others, are made by a patented method by which a cutting edge of Genuine 18% Tungsten High Speed Steel is welded to a Chrome-Vanadium Steel body. Combining the long-lasting, fast-cutting qualities of high speed steel with the tough unbreakable characteristic of tough alloy, MARVEL Hole Saws provide a new type of tool capable of withstanding the terrific peripheral speeds met in sawing large diameter holes. Ample in tooth set, MARVEL Saws are not limited to work in sheet metals but will stand up on deep drilling production work. Because they save circumferences, rather than reduce all metal to shavings as in drilling or boring, MARVEL Hole Saws require far less power for hole size—step up the capacity of drill presses and portable tools; and greatly reduce the cost and machine tool requirements for cutting large holes.



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"The Hack Saw People"

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**Production
Strength!**

MARVEL Hole Saws are recommended for production work in heavy steels on drill presses.



tons, but old business is coming freely to mills, which report specifications fully equal to the average of recent weeks. Bids on the Denver, Colo., post office have been returned unopened but at St. Louis the low bidder on the post office has been announced. The Kansas City contractor who is building the spillway at Fort Peck, Mont., is low bidder on the 9000 tons of steel piling on which bids were recently taken. Fresh inquiries lean heavily toward dams and bridges, though two small industrial buildings are up for figures.

Plates

More than 65,000 tons of rolled steel will be required for the 5125 cars that are to be purchased by the Chesapeake & Ohio, which will also purchase 20 locomotives. Mills are still looking forward to releases of plans for additional dams on the Mississippi River that will help the slow plate market.

Sheets

New sales are unusually slow. Immediate requirements are dictating the buying policies of most consumers. Specifications show only moderate shrinkage, but here again there is no evidence that shipments exceed the tonnage that is consumed from day to day.

Rails

The Grand Trunk Western has ordered 8450 tons of rails from Chicago mills. Releases are such that they will be worked in with present schedules so that, at the present rate of output, mills will be engaged for about two months. It is estimated by the trade that about 15,000 tons of rails will be ordered during the summer months.

Bars

Both sales and specifications are moderately lower, and this drift once more accentuates the trend in automobile manufacturing plants. The general run of miscellaneous business in bars is steady, as it has been for a number of weeks. The strike at the Case plant at Racine, Wis., has been settled after a duration of more than 80 days. Agricultural equipment plants, though in a change-over period from certain types of equipment to others, show no disposition to curtail takings of steel.

Scrap

Influences that bear down on the scrap market are more pronounced and prices are nominal and lean to the weak side. Brokers now find ample supplies of heavy melting steel at \$10 a ton delivered consumers' yards, and tonnages appearing on track are giving trouble. Mill operations, though steady



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at the moment, seem destined for lower levels and operators will not listen to offers by the scrap trade. Inquiry that came here from points east of Chicago has vanished. Lists are being offered by the Chicago & North Western and the Rock Island.

In the report of the convention of the mill supply industry in THE IRON AGE of May 23, it was reported that a joint resolution favor-

ing extension of NRA was adopted by the Southern Supply and Machinery Distributors Association, the National Supply and Machinery Distributors Association and the American Supply and Machinery Manufacturers' Association. The last-named body reports that it did not vote on this subject because of the number of codes represented by its membership and the belief that prior contact should be made with those code authorities.

Demand Well Maintained In Cleveland District



Ingot Rate Is Unchanged and Efforts
to Break Price Structure Have Thus
Far Been Without Success

CLEVELAND, June 4.—Demand for finished steel has been affected very little by the uncertainties resulting from the elimination of the steel code and the removal of all control over prices. Had not the holiday intervened the volume of business the past week probably would have shown only a slight decline from the previous week. Consumers have continued to place orders for steel for only early requirements, as they did when the code was operative.

Ingot output in the Cleveland-Lorain territory is unchanged this week at 45 per cent of capacity.

Efforts by large consumers to break prices or at least to test out the market quickly followed the withdrawal of code regulations. Inquiries for large tonnages of sheets, in some cases for deliveries extending until the end of the year, have been put out by Michigan automobile manufacturers and by consumers in this territory. Next to sheets, cold-rolled strip is regarded as the most vulnerable product from the standpoint of price maintenance in an unsettled market. However, a firm determination to maintain code prices and regulations is being shown by steel producers, and it is expected to take two weeks or more to definitely establish whether present prices will hold or weaken. Lower prices, steel makers contend, will have to be followed by a cut in wages.

With the rapid stepping up in inquiries involving considerable steel, the Muskingum district conservation project is the outstanding undertaking in the construction field. Several thousand tons of steel in various forms will be required for work in connection with that project, for which bids will be taken at various dates this month.

The Chesapeake & Ohio Railroad will take bids next week against its inquiry for 5175 freight cars and five steam locomotives. This railroad is now having built several test cars of high-tensile steel, and alternative proposals calling for high-tensile steel construction probably will be submitted.

Pig Iron

New demand is holding close to recent volume in spite of a tapering in business from automotive foundries. However, sales are lighter than shipments. Agricultural implement manufacturers continue to order freely and there is a heavy demand for castings from tractor manufacturers. Consumers are buying only for immediate needs. Producers are holding to code prices and regulations. A Lake furnace interest sold 9000 tons during the week in lots up to 500 tons.

Sheets

While some new business is coming from the automotive industry,

demand from that source, as well as from other consumers, shows a downward tendency. Many buyers feel uncertain whether present prices will be maintained, now that the steel code has been eliminated, and some are testing out the market with inquiries which in some cases are for the remainder of the year. However, there are no reports of price concessions and sellers are unwilling to quote for beyond the third quarter.

Strip

Some new business for June shipments, mostly in hot-rolled strip, were placed during the week by General Motors parts-making plants. Little new business is coming from other consumers in the automotive field. Buyers are closely watching the market for any possible concession in prices.

Iron Ore

Water shipments during May amounted to 3,503,795 tons, an increase of 873,217 tons over the same month last year. Shipments until June 1 were 3,903,857 tons, a gain of 1,273,279 tons over the corresponding period in 1934. The gain, amounting to 48.40 per cent over the same period last year, is due to a movement of 400,000 tons in April this year as compared with no shipments during that month last year and to the fact that shipments last year did not get well under way until around the middle of May.

Bars, Plates and Shapes

Bids for 11 railroad bridges requiring 2100 tons of structural steel in the relocation of tracks in the Muskingum Conservancy district have been asked for by United States Engineers at Zanesville, Ohio. Relocation of the main gas line of the East Ohio Gas Co. will require 13¼ miles of new pipe, for which inquiry is also out. Other new inquiries, about a dozen in

NEW DATA SHEETS

ON

HY-TEN, ECONOMO, & S. A. E. STEELS

WHEELLOCK, LOVEJOY & COMPANY, Inc.

CAMBRIDGE

CHICAGO

CLEVELAND

DETROIT

number, which have come out for dams, levees, gates and other work in connection with the Muskingum project, are supplemental to several others previously reported requiring considerable tonnage of reinforcing bars for which bids are being advertised. The Main Street bridge, Columbus, requiring 500 tons of reinforcing bars and 600 tons of steel piling, has been awarded to the General Asphalt Paving Co., Canton. The Nickel Plate Railroad shortly will have plans out for a bridge taking 1000 tons of structural shapes. Demand for merchant bars in carlots is holding up fairly well from automobile, agricultural implement and road equipment manufacturers.

Bolts and Nuts

Semi-finished hexagon nuts larger than 1 in. in diameter, in both U.S.S. and S.A.E., have been advanced to 70 per cent off list from 70, 10 and 5, which is quoted for 1 in. in diameter and smaller. These nuts, larger than 1 in. in diameter, formerly carried a higher price than the smaller sizes, but the differential was eliminated a few months ago.

Scrap

There is no new consumer demand but the market is firm, as prices are being maintained at recent advances by dealer purchases to fill outstanding orders. Dealer buying is largely for Youngstown delivery, for which dealers are paying \$11.25 to \$11.75 for No. 1 heavy melting steel and \$10.25 to \$10.75 for No. 2. Most consumers have good stocks, and, in view of the uncertainty that has resulted from the elimination of the NRA, not much activity is expected during the next two or three weeks. New lists are out from the New York Central, Erie and Nickel Plate railroads. Automobile manufacturers also have issued lists covering their June production, mostly in borings and turnings, their lists being fairly large.

Cast Iron Pipe

Kaukauna, Wis., has placed 1000 ft. of 6-in., and 2600 of 8-in. with James B. Clow & Sons.

Waldo, Wis., will take bids soon on 2400 ft. 4-in. and 5200 ft. of 6-in. for new waterworks system.

Marquette, Mich., has placed 11,000 ft. of 8-in. with McWayne Cast Iron Pipe Co.

Spencer, S. D., has secured Federal loan of \$30,000 for water supply system, including 12,000 ft. of various sizes, pumping station and elevated steel tank and tower. Work will begin soon. A. McWayne, 322 Paulson Block, Sioux Falls, S. D., is consulting engineer.

Board of Henrico County Supervisors, Highland Springs, Va., plans pipe lines for water supply. Fund of \$77,000 has been authorized.

Rochester, Ill., asks bids until June 10 for pipe for water system and other waterworks construction. Fund of \$53,000 has



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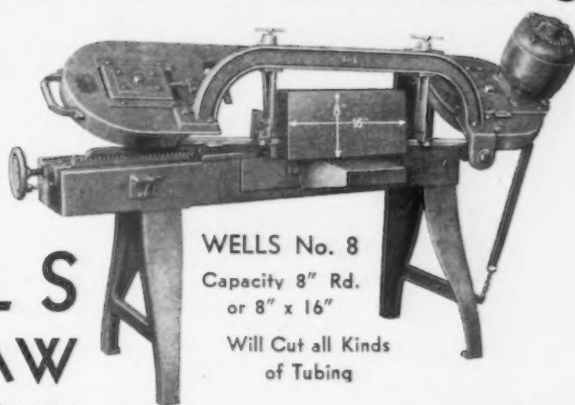
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WELLS No. 8

Capacity 8" Rd.
or 8" x 16"

Will Cut all Kinds
of Tubing

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been arranged through Federal aid. Warren & Van Praag, Inc., Milliken Building, Decatur, Ill., is consulting engineer.

Stevensville, Mont., plans 26,045 ft. of 4, 6 and 8-in. for water system, replacing present mains. Financing is being arranged through Federal aid.

Milltown, Ind., will soon take bids for pipe for water system. Fund of \$55,000 has been arranged for this and other waterworks installation. Lennox & Matthews, Architects' Building, Indianapolis, are consulting engineers.

Waldo, Wis., will soon take bids for 7700 ft. of 4 and 6-in. for water system; also for pumping station equipment. Later elevated steel tank and tower will be purchased. Robert Cramer & Sons, 647 West Virginia Street, Milwaukee, are consulting engineers.

Patoka, Ill., plans pipe lines for water system. Financing is being arranged through Federal aid. Kinsey Engineering Co., Pekin, Ill., is consulting engineer.

Baxter Springs, Kan., plans about 10,000 ft. of various sizes for replacements in present water mains. F. G. Willis is city engineer.

Beaumont, Tex., closes bids June 11 for 5000 ft. of 8-in. for water system. R. R. Vieno is superintendent of construction, Water Department.

Stella, Neb., will soon take bids for 12,000 ft. of 4 and 6-in. for water supply; also for 40,000-gal. elevated steel tank and tower, and deepwell turbine pumping unit and accessories. Henningson Engineering Co., Union State Bank Building, Omaha, Neb., is consulting engineer.

Hartsville, Tenn., will soon take bids for pipe for water system and other waterworks construction. Freeland, Roberts & Co., Nashville, Tenn., are consulting engineers.

Melrose Park, Ill., plans pipe lines for water system; also other waterworks equipment. Financing is being arranged through Federal aid. Municipal Engineering & Equipment Co., 212 South Marion Street, Oak Park, Ill., is consulting engineer.

Cleveland will take bids June 7 for 2½ miles of pipe for a 14-mile sewer sludge line. Specifications call for 600 tons of 12-in. cast iron pipe but alternate bids will be received for steel pipe.

Eureka, Cal., has awarded 100 tons of 6-in. to American Cast Iron Pipe Co.

Emerytown, Utah, has placed 235 tons with Pacific States Cast Iron Pipe Co.

Inglewood, Cal., will open bids June 10 on 108 tons.

Heber City, Utah, will vote on bonds in July which will provide for 256 tons of 6-in. for water system improvements.

San Mateo, Cal., will open bids June 17 on 206 tons of 20-in., with alternate on wood.

Pipe Lines

Stanolind Oil & Gas Co., Tulsa, Okla., and Houston, Tex., has authorized surveys for welded steel pipe line from oil field district, east Texas, where connection will be made with present trunk line of company, to Texas City, Tex., for crude oil supply for refinery of Pan-American Petroleum & Transport Co., at last noted place. Bulk oil storage and distributing plant will be constructed in oil field territory in connection with new line. Cost about \$250,000.

United States Engineer Office, Zanesville, Ohio, asks bids until June 15 for steel pipe lines for gas service of East Ohio Gas Co., covering changes in lines Nos. 4 and 5 of that company to be made by Government at Atwood Reservoir (Circular 109).

Wyoga Gas & Oil Corp., Susquehanna Building, Williamsport, Pa., plans about 10,000 ft., welded steel pipe for natural gas service from Potter County gas fields, near Coudersport, Pa., where company will soon begin drilling of wells.

Austin, Minn., plans call for bids in June for steel pipe for municipal natural gas supply and distribution. Fund of \$175,000 has been authorized. Black & Veatch, Mutual Building, Kansas City, Mo., are consulting engineers.

Pure Transportation Co., Carson City, Mich., an interest of Pure Oil Co., 35 East Wacker Drive, Chicago, has authorized immediate construction of new 4-in. welded steel pipe line from oil field district in Crystal Township, Montcalm County, Mich., to Carson City, for crude oil. A 10-car loading and distribution terminus will be built at Grand Trunk Railway yards at latter place.

Board of County Supervisors, Los Angeles, will soon take bids for 48-in. welded steel pipe to be used as sand trap riser for new elevated steel water tank on county property at Hondo, near Downey, Cal., including 6-in. overflow pipe line. William Davidson, Hall of Records, Los Angeles, is chief mechanical engineer.

Buyers Adhere to Waiting Policy at New York



Strong Sentiment Exists Among Mills to Hold Prices—Regulations No. 9 and Jobbers' Agreements Regarded as Vulnerable

NEW YORK, June 4.—Steel demand has dropped to a low level as both sellers and buyers wait to get a clearer view of the effects of the scuttling of NRA. Some buyers have dangled substantial tonnages before mills in the hope of obtaining concessions, but thus far producers have held fast to existing quotations. Now that NRA compulsion has been removed, mills realize that the full responsibility for maintaining code wage and working standards has been thrown into their laps and they are in no mood to court trouble by lowering the supporting price structure. Many consumers are also in favor of continued stability, though they naturally wish to get the benefit of price cuts if any are made. The unfavorable popular reaction to the revival of loss leaders by department stores is regarded as an indication that NRA experience has made everyone more keenly conscious of the intimate relationship between prices and costs, and

proportionately more resentful of competitive practices that threaten wage levels.

Some deviations from code practices may be made without necessarily upsetting the entire price structure. It is possible that Regulations No. 9 governing fabrication in transit may not be adhered to as generally as heretofore, but this provision has long been a subject of sharp controversy. Some of the jobber agreements may break down, but observance has never been 100 per cent and among pipe jobbers there have been open violations for some time. Whether the larger buyers will be able to obtain concessions on quantity purchases is a question that will eventually come to the fore. Their contention is that it is more economical for mills to roll large tonnages and that the saving should be reflected in part in the prices paid. A test will no doubt be provided by a current inquiry from the Chesapeake & Ohio for 5000 freight cars and five locomotives,

requiring 75,000 tons of steel. In pre-code years the carbuilders frequently bought at \$3 to \$5 a ton below the market.

Bids will be received June 6 on the Manhattan approaches to the Thirty-eighth Street tunnel under the Hudson River, calling for 5000 tons of steel. The Hendrik Hudson bridge over the Harlem River, on which bids go in June 14, will require 6000 tons of structural steel and 580 tons of reinforcing bars. Tenders taken by the Independent Subway System, New York, on 500 cars showed the Pressed Steel Car Co. low on 250 and the American Car & Foundry Co. low on the other 250, while the Pullman-Standard Car Mfg. Co. submitted the low figure on the whole 500.

American Houses, Inc., New York, has placed an order with Kalman Steel Corp. for steel members formed from 1/4-in. strip for the construction of 21 to 34 steel houses.

Pig Iron

Consumers came into the market for 1600 tons of iron during the past seven-day period, as compared with 1450 tons in the preceding week and 1400 tons booked a fortnight ago. This market has failed to show any definite reaction to the collapse of the steel code. Buyers continue to order only for immediate needs and have made no forceful overtures for securing lower quotations on their modest requirements. Likewise, furnace representatives insist that no shading of code prices has occurred nor will there be any lowering of quotations in the near future. Nevertheless most consumers view the price structure as uncertain and are therefore loath to purchase more than a month ahead. This conservative position, however, may be altered if the threat of a coal strike becomes more serious, for many foundries are in a very short stock position and may order ahead more freely to guard against a possible iron shortage.

Reinforcing Steel

Distributors report a slight improvement in small-lot ordering. Thomasetti Contracting Co. is low bidder on 820 tons for a sewer in Queens, N. Y., and Tully & Dinapoli are low bidders on 200 tons of bars for the foundations of the Bronx span of the Triborough Bridge. In addition to these two projects about 1600 tons of bars is still active, but final awards are being delayed in many cases in view of the uncertainty in some quarters as to the stability of current prices. Although mills deny any intention of lowering quota-

The Products

The Plant

The Question

The Name

The Location




Do you use such products and do you appreciate quality, prompt deliveries, attention, and perfect packaging?

If so write

CLARK BROS BOLT CO.

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tions on reinforcing steel, several large tonnages in this area are being offered as an inducement for such action.

Scrap

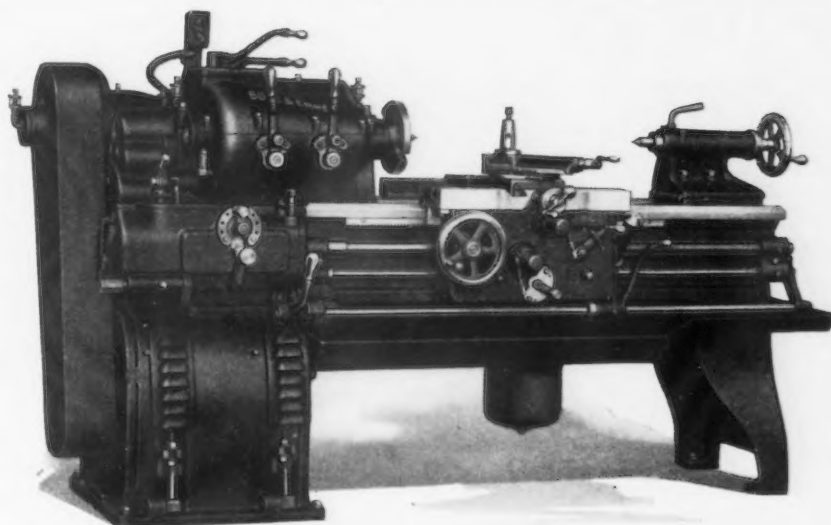
Brokers' buying prices on all important grades are quotably unchanged and very firm. Although the volume of domestic business continues almost negligible, export activity is as great as it has ever been in this territory. However, the difficulty in securing boats continues to hamper leading exporters to some extent, and for this reason Japanese deliveries are not as heavy as were expected. Also, Italian deliveries continue at a slow rate because of uncertainties regarding payment. Current shipments to that country, however, are considerably better than they have been during the past two months. The British Isles continue to take fair deliveries of cast iron and stove plate and occasional turnings.

Business Checked in Southern Ohio

CINCINNATI, June 4.—The Supreme Court's decision nullifying the code retarded business in the iron and steel markets here as the trade awaited signs of business trends. The scrap market, particularly, eased and the activity of a week ago almost disappeared. Dealers retired from speculative activities and have adopted an attitude of watchful waiting. Expected mill purchasing has failed to materialize, but some material is still moving on old contracts, which are near expiration. Prices are softer, but no change has been made pending some test. Inventories are reported low and any increase in mill operation should be reflected in renewed activity in the old materials market. Malleable scrap is in fair demand, but the supply is limited.

Pig iron demand is fluctuating from week to week within narrow limits, but recent buying, at its maximum, has been about 20 per cent below the peak of a month ago. The usual seasonal lull is evident, while the influence of the recent code decision is seen in the questioning attitude of the trade generally. Some are looking to the Gray Iron Founders' meeting on June 6 here to help clarify the situation. Foundry operations are also slower. Furnaces are adhering to previously announced schedules and a change in price is unlikely. Hamilton iron is quotable

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The Chicago Daily News Bldg., 400 W. Madison Street, Chicago

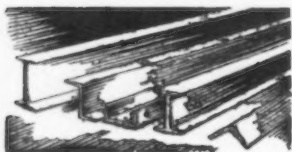
at about \$19.58, delivered in Cincinnati, while Southern is \$19.20, the 38c. differential still obtaining.

The leading district mill interest, upon contact with the greater portion of sheet users in this district, reports that virtually all the consumers are desirous of cooperating in sustaining the market on an even keel. Demand for finished sheets is holding at about 60 per cent of capacity. Automotive and

refrigerator production is reacting to the usual seasonal influences, while demand for galvanized sheets generally has improved. No price changes are anticipated.

Specifications for foundry coke grades have tended upward, following moderate improvement in the automotive melt. Price advances of 50c. on domestic grades to \$5, effective June 3, have been announced.

Prices Hold at Philadelphia; Production at 32 Per Cent



E. G. Budd Mfg. Co. Books 35,000-Ton Chevrolet Frame Order—Scrap Exports Average About 10,000 Tons Weekly

PHILADELPHIA, June 4.—According to opinion in this district, the steel industry is still bound to adhere to filed code prices and extras until June 16. Although the code apparently was invalidated by the recent Supreme Court decision, mills in this area believe that current quotations will be strictly maintained until June 16 at least. Each producer has likewise stated that any price deviation after that date will be inaugurated by some other company. It is thus evident that current prices and wages should be extended into the coming quarter.

Prices are currently quite firm. Several attempts on the part of plate users have failed to develop shading and a number of smaller miscellaneous consumers have not even questioned the price levels. However, steel mills are now in a difficult position, inasmuch as purchasing agents may slowly break prices through intimation that lower quotations are available elsewhere. Such statements carried little weight during the operation of the code.

All mills in this area are working at a rate approximately equal to that of last week and production is maintained at 32 per cent of capacity. It is probable that both Alan Wood and Worth Steel will keep two furnaces on for the remainder of the month, but the three furnaces at the Steelton plant of Bethlehem Steel Co. will probably be shut down some time during the next 10 days.

Pig Iron

Strict adherence to code prices on the part of all iron sellers has stabilized this market. Buyers are again in the market for nearby requirements but, naturally enough, very few orders are coming through for third-quarter delivery. Production costs of all furnaces have markedly advanced during the past year and they are, therefore, far from willing to entertain suggestions of price concessions. Also the market is not endangered by excessive stocks, for only a few furnaces are in blast in this area, and other furnaces have shown no intention of blowing in. The

threatened coal strike is being watched with interest here.

Sheets and Strip

Local autobody stamping plants have purchased practically no steel during the past week with the exception of a few fill-in tonnages for 1935 models. Both Heintz Mfg. Co. and the E. G. Budd Mfg. Co. are making new dies for 1936 models and will probably not be in the steel market in a big way again for several months. The E. G. Budd Mfg. Co. has just booked a large order for Chevrolet truck and passenger car frames. The frames will be partly welded and partly riveted, and approximately 35,000 tons of strip will be required. If this tonnage is bought at one time and if this company decides to shop for the material, the purchase will offer a specific test of currently quoted prices.

Bars, Plates and Shapes

During the week two moderately large tonnages of plates were offered to the trade in an effort to secure price concessions. This shopping around was unsuccessful, and the tonnages were finally placed with regular suppliers at code price levels. Makers of gas holders report a distinct betterment in business and are purchasing plates in better volume. The Pennsylvania Railroad has just issued requirements for third quarter, on which bids are due June 18. The demand for reinforcing bars continues at a low ebb. No new inquiries of any size are in the market, and the only award of the week was for 100 tons to Kalman Steel Co. for two separate buildings in the Philadelphia area. The delay in public works allotments continues to reflect in very poor business for distributors and fabricators of structural shapes. The Library of Congress annex tonnage is still being held up, and awards during the week totaled only 450 tons.

Imports

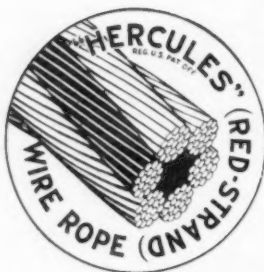
The following iron and steel imports were received here last week: 103 tons of structural shapes from France; 89 tons of steel bars, 53 tons of steel bands and 44 tons of structural shapes from Belgium, and 24 tons of steel bars, 4 tons of steel tubes and 2 tons of steel rods from Sweden.

Scrap

Although this market is only moderately active, its undertone is strong on the basis of regular deliveries to domestic melters and considerably heavier deliveries of export steel to Port Richmond. Claymont continues to take No. 1 steel and cast iron car wheels, Coatesville is accepting No. 2 steel,

Results Are What Count

If you want real economy—look to results rather than to first cost. It is on this basis that "HERCULES" (Red-Strand) Wire Rope continues to make and hold friends. There are reasons, of course, why this wire rope is so dependable and long lasting, and we are always glad to give full details to everyone interested in saving money. Made in a wide range of constructions including Round Strand, Flattened Strand, Preformed, Non-Rotating and Steel Clad types.



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A. Leschen & Sons Rope Co.

ESTABLISHED 1857

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NEW YORK—CHICAGO—DENVER—SAN FRANCISCO

turnings and heavy breakable cast, and Harrisburg is buying breakable cast and stove plate. Brokers are paying at least \$7.75 for stove plate and \$8 for No. 2 steel at Phoenixville, and Pencoyd is picking up small quantities of No. 2 from local dealers at \$8.75. Bethlehem is buying No. 1 and No. 2 in the Baltimore area at \$10 and \$9 respectively for Sparrows Point delivery, and continues to purchase unprepared in the Philadelphia district for Bethlehem delivery at prices ranging from \$3 to \$7.50 a ton. The heavy breakable cast market is somewhat stronger at \$11 a ton on the strength of a recent sale of a moderate tonnage at that figure. Export loadings continue in heavy volume. Two boats cleared for Japan last week, each carrying over 7000 tons of steel. Another cargo of 7500 tons will probably leave during the next week.

Scrap Market Holds At Boston

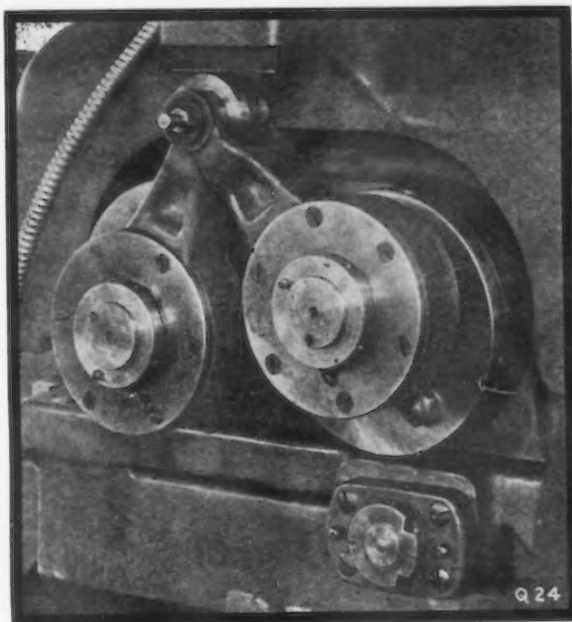
BOSTON, June 4.—Furnace representatives have been advised that code rules will continue to be observed. As a result, there has been no modification of pig iron prices in this district. Bookings of third quarter business have been comparatively active, aggregating 2000 tons for the week, but business for delivery during the current quarter continues very quiet.

The past week a steamer with 5800 tons of scrap cleared here for Rumania, and another with 7800 tons for Italy. At the moment no boats are loading, but exporters are buying No. 1 steel at \$8.50 a ton, delivered army base here, for future delivery; No. 2 steel at \$7.50 a ton, and other exportable scrap at unchanged prices. The market for steel turnings and bundled skeleton, Pennsylvania delivery, is a shade firmer, the lowest price on turnings now being \$2.40 a ton, f.o.b., and on skeleton, \$5.05. As better export prices prevail, domestic deliveries of these materials are quite small.

A slight downward revision in warehouse prices on structural steel has been made, due to a correction in freight rate computation.

Suggest Trade Papers For Price Filings

BELIEVING that the greatest advantage to the industry offered by the iron and steel code was the method of open price filing, it has been suggested by the Alan Wood Steel Co., Conshohocken, Pa., that



ESCAPE
guessing
muss
and
fuss

Guessing causes uncertainty. Usually it is inaccurate. Muss and fuss do not make for peace of mind. Efficiency is not one of their offsprings.

Escape them all. Use the Landis Type B Hydraulic Roll Grinder and profit from the accuracy and convenience of its crowning and concaving mechanism. Set two easily accessible dials. Nothing more. The roll contour it produces will be the one you want.

Who would not prefer certainty and speed to guess, muss and fuss? Not you! Then act. First by sending for catalog No. H-34.

182

LANDIS TOOL CO.
WAYNESBORO, PA.

THE IRON AGE and *Steel* be substituted for the American Iron and Steel Institute as a clearing house for minimum price filings of all steel commodities in a manner similar to that which has been carried on under the steel code.

In order to bring the suggestion to the attention of the industry, A. L. Meyer, vice-president in charge of sales for the Alan Wood company, sent the following telegram to Walter S. Tower, executive secretary of the American Iron and Steel Institute:

"The Alan Wood Steel Co., mind-

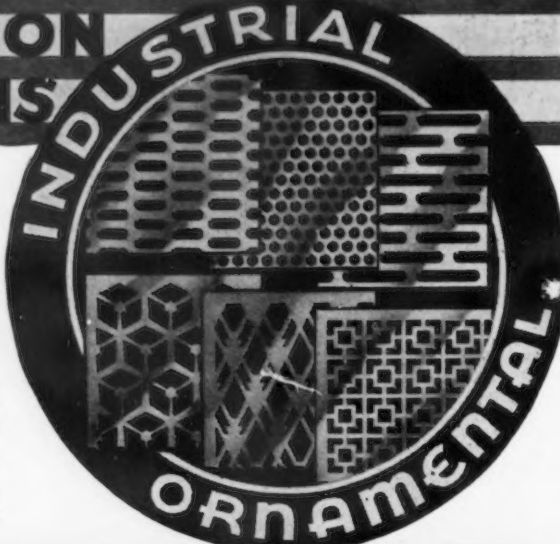
ful of benefits derived by the steel industry from open price filings as formerly practised under the steel code, strongly recommends and urges the directors of the American Iron and Steel Institute to consider a voluntary action on the part of its members to make use of the publications, *THE IRON AGE* and *Steel*, as the official clearing house for price filings of all steel commodities recognized as such by the Iron and Steel Institute."

It is understood that the matter will receive attention at a general meeting of institute members.

PRECISION SCREENS

In the preparation of food products and in the screening, sizing and straining operations of chemicals, minerals, stone, coal and other materials, perforated metal plays an important part. H&K standards of quality and accuracy assure you of all that is best in screens. May we aid you in your selection?

Grilles of unusual beauty in exclusive designs suitable for public and commercial buildings and private homes. Ornamental sheets for radiator enclosures and metal furniture are furnished of any metal. Write us for prices and samples.



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Fabricated Structural Steel

Lettings Small—New Projects Lower

STRUCTURAL steel awards of 5700 tons are the lowest since the last week in January. The only sizable booking is 2000 tons for a dental school for the Louisiana State University, New Orleans. New projects of 9850 tons compare with 28,000 tons last week and 6700 tons two weeks ago. Among new jobs are 2100 tons for bridges in connection with the relocation of railroad tracks in the Muskingum Conservancy District and 1700 tons for the Acacia Life Insurance Co., Washington. Plate awards of 5600 tons include 3350 tons for elevated water tanks in Buffalo. Structural steel contracts in May called for 52,200 tons compared with 60,275 tons in April and 79,150 tons in March. Structural steel awards for the week follow:

NORTH ATLANTIC STATES

West Hartford, Conn., 225 tons, college dormitory, to Standard Structural Steel Co.

Manhasset, N. Y., 280 tons, junior high school, to Lehigh Structural Steel Co.

West Chester, Pa., 220 tons, Friends Home, to Lehigh Structural Steel Co.

Philadelphia, 135 tons, steel for screens for Pennsylvania Railroad, to Cornell Iron Works.

Philadelphia, 120 tons, alterations for Owens-Illinois Co., to Frank M. Weaver Co., Philadelphia.

Hornell, N. Y., 170 tons, bridge, to Lackawanna Steel Construction Co.

Fulton, N. Y., 200 tons, building for Kohler Swiss Chocolate Co., to McClintic-Marshall Corp.

Rahway, N. J., 520 tons, office building for Merck & Co., to Lehigh Structural Steel Co.

Washington, 140 tons, pumping station, to Ingalls Iron Works Co.

THE SOUTH

Louisville, Ky., 330 tons, tobacco warehouse for Brown & Williamson Corp., to McClintic-Marshall Corp.

New Orleans, 2000 tons, dental school building, Louisiana State University, to Jones & Laughlin Steel Corp.

CENTRAL STATES

Cincinnati, 380 tons, building No. 9 for F. W. Woolworth Co., to American Fabricated Steel Corp., Philadelphia.

Warsaw, Ohio, 125 tons, Mohawk Dam, Muskingum Valley Conservancy District, to American Bridge Co.

Rochester, Minn., 230 tons, electric light plant, to Lakeside Bridge & Steel Co.

Newton, Iowa, 180 tons, addition for May-Tag Co., to Pittsburgh-Des Moines Steel Co.

WESTERN STATES

Los Angeles, 100 tons, crane runway for Department of Water and Power, to Consolidated Steel Corp.

Chelan County, Wash., 140 tons, State bridge over Wenatchee River, to an unnamed bidder.

Pierce County, Wash., 180 tons, State underpass under Northern Pacific Railroad, to an unnamed bidder.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Hallowell, Me., 300 tons, State highway bridge.

Richmond, N. Y., 380 tons, Nurses Home, Sea View hospital.

Washington, 1700 tons, office building for Acacia Life Insurance Co.

SOUTH AND SOUTHWEST

Wheeler Dam, Ala., 1400 tons, gates.

Rogers, Okla., 573 tons, highway bridge; M. E. Gillioz, Monett, Mo., low bidder on general contract.

CENTRAL STATES

Fort Wayne, Ind., 350 tons, Joplin Mfg. Co.

Cleveland, 165 tons, administration building for Easterly sewage disposal plant; J. L. Hunting Co., Cleveland, low bidder for general contract.

Zanesville, Ohio, 2100 tons, 11 railroad bridges in connection with relocation of railroad tracks in Muskingum Conservancy district; bids to be taken by United States Engineers, June 20.

Toledo, 150 tons, building for Libby-Owens-Ford Glass Co.; bids taken.

Nickel Plate Railroad, 125 tons, two bridges; plans out.

Nickel Plate Railroad, 1000 tons, bridge; plans to be out soon.

Marshfield, Wis., 175 tons, factory.

St. Louis, 350 tons, mail handling equipment for postoffice; Alvey-Ferguson Co., Cincinnati, low bidder.

Kansas City, Kan., 800 tons, high school building; bids June 8.

WESTERN STATES

Denver, 700 tons, post office; bids returned unopened.

Bonneville, Ore., 5126 tons of structural steel, 332 tons of steel castings and 449 tons of miscellaneous steel, gates for powerhouse and spillway dam; bids June 25 at Portland.

Odair, Wash., 400 tons, frames.

FABRICATED PLATES

AWARDS

Malden, Mass., 1200 tons, 48-in. water pipe, to Walch Steam Boiler Works, Holyoke, Mass.

Buffalo, 3350 tons, elevated water tanks, to Chicago Bridge & Iron Works.

Baltimore, 120 tons, two tanks for Federal Yeast Corp., to Graver Tank & Mfg. Corp.

Urbana, Ill., 155 tons, tanks for University of Illinois, to Chicago Bridge & Iron Works.

North Baton Rouge, La., 140 tons, separators for Standard Oil Co., to Petroleum Iron Works.

Fort Peck, Mont., 535 tons, dredge pipe, to McClintic-Marshall Corp.

Jacksonville, Ore., 100 tons, pipe, for city water system, to an unnamed bidder.

NEW PROJECTS

Washington, 350 tons, launches.

Pittsburgh, 300 tons, two steel tank barges for Gulf Refining Co.; bids June 10.

SHEET PILING

Columbus, Ohio, 600 tons, Main Street bridge; general contract awarded to General Asphalt Paving Co., Canton, Ohio.

Fort Peck, Mont., 9000 tons; Kansas City contractor on spillway is low bidder.

Canadian Road Buys 7000 Tons of Rails

TORONTO, Ont., June 4.—The Dominion Steel & Coal Corp., Sydney, N. S., has received an order for 7000 tons of steel rails from the Canadian Pacific Railway. At present the Sydney plant is

rolling 12,000 tons of rails for the South African Government.

The bill authorizing the Dominion Government to guarantee \$8,000,000 Canadian National Railway and \$7,000,000 Canadian Pacific Railway equipment certificates has passed the House of Commons. This will mean about \$4,000,000 in orders for the railway shops and some \$11,000,000 of orders for private equipment manufacturers.

National Steel Car Co., Canadian Car & Foundry Co., and possibly Canadian Locomotive Co., are expected to benefit.

Railroad Equipment

Wheeling & Lake Erie has placed an order with Timken Roller Bearing Co., Canton, Ohio, for bearings and boxes to equip all driving axles of two new class 0-6-0 switching locomotives. This railroad has also placed an order with Timken company for inboard type trucks for use under tenders of these locomotives. Locomotives will be built in Brewster, Ohio, shops of the railroad company.

Chesapeake & Ohio will buy 5000 50-ton hopper cars, 75 50-ton flat cars, 50 40-ton stock cars and 20 locomotives.

Chicago Surface Lines plan to take figures on 100 street cars.

RAILS

Grand Trunk Western has ordered 8450 tons of rails from Chicago mills.

Seattle has opened bids on 1000 tons of rails.

Texas & Pacific has ordered 7700 tons of rails from Tennessee Coal, Iron & Railroad Co.

Canadian Pacific has ordered 7000 tons of rails from Dominion Steel & Coal Corp., Sydney, N. S.

CRANES

Quartermaster, Marine Corps, Washington, asks bids until June 12 for one gasoline engine-driven locomotive crane (Schedule 763).

United States Engineer Office, Zanesville, Ohio, closes bids June 14 for one 40-ton, one 20-ton and four 10-ton traveling cranes; also for three 2-ton trolley and chain hoists, and one 2-ton chain hoist (Circular 108).

Rail Order Sustains Output in South

BIRMINGHAM, June 4.—An order for 7700 tons of rails, placed last week by the Texas & Pacific Railway, has postponed the shutdown of Ensley rail mill operations for about ten days. Prior to the booking of this order plans had been made to stop the plant on June 1.

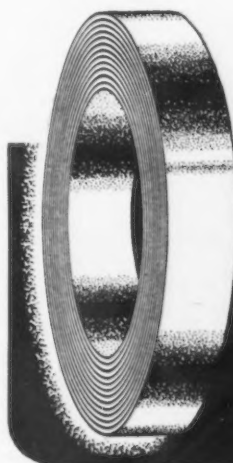
With the continuation of the rail mill, no changes have been made in blast furnace and open-hearth operations. Ten blast furnaces and 11 open-hearth units were active last week and the same number are scheduled for this week.



Concentrating exclusively in the production and application of cold rolled strip steel, the specialized experience of the Thomas organization provides that cooperation with manufacturers which insures better products at economical cost . . . From proper specification, through exacting production and dependable delivery, Thomas service most adequately meets every requirement of modern industry for cold rolled strip steels—bright finish, electro zinc, copper or cadmium coated . . . A Thomas representative will gladly cooperate with you in the application of Thomastrip to your production.

Test Thomastrip for your product. Send for test samples. Specify gauge, width, temper and coat desired.

THE THOMAS STEEL CO. - WARREN, O.
SPECIALIZED PRODUCERS OF COLD ROLLED STRIP STEEL



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STRIP  STEEL

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Southern markets have been fully affected by the uncertainties that have arisen as a result of the Supreme Court's NRA decision, but the iron and steel industries continue to adhere to the stipulations of the old codes and price quotations remain on the old basis. However, there was no sharp reaction in business, for there has been a drag in buying during the past four weeks. Consumers have been buying sparingly and largely for immediate requirements, with an eye more to possible Congressional changes than to any expectation of such an upset by the Supreme Court.

Pressure pipe manufacturers are apprehensive as to what effect the

NRA decision will have on pending June tonnage. One project was postponed last week as a direct result of it. The recent decision of the PWA to increase grants from 30 per cent to 45 per cent may also affect June business, pending a decision as to whether the increase will be retroactive to projects with bid dates already set.

Basic revisions in interstate railroad rates became effective June 3 and on June 8 an intrastate surcharge will start in Alabama, but the prospect of these has not increased bookings to any extent, since in most cases the changes are not large enough to warrant consumer's stocking up in the face of present uncertainties.

CORROSION RESISTING STEELS

DURCO KA2S

DURCO KA2SMo

DURIMET



THOUSANDS OF PIPE FITTINGS, in our corrosion-resisting alloys, have been delivered to customers. Your requirements in screwed pipe fittings can be supplied from stock.



A TICKLISH MOULDING JOB—bubble caps of Durco KA2SMo. Over 2,700 of these were made on one order.



LOW CARBON DURIMET PICKLING BASKET made for use with 20% Sulphuric Acid.

If you are buying and using corrosion-resisting alloy steels, consider *low carbon Durco KA2S*, with or without Molybdenum, or *low carbon Durimet*. They have that quality of corrosion-resistance poured into them that will please you.

Dense, smooth, clean, equal wall thickness—all reveal foundry technique gained only through years of experience.

We are glad to cooperate and make unbiased suggestions.

Write **THE DURIRON COMPANY**, 438 N. Findlay St., Dayton, Ohio.

This Week on the Assembly Line

(CONTINUED FROM PAGE 63)

output as well as cut costs at the Plymouth plant.

A deal which is being revived after languishing for several months is that for a large amount of equipment for the Autostroy organization in Russia. Prices have been quoted by American equipment makers on machinery to augment production and reduce costs of the Model A Ford in Russia. Consummation of the deal has been delayed because of inability of American companies to agree with officials of the Amtorg corporation on credit terms, the former insisting on cash or relatively short term notes. If the

transaction is closed shortly as intimated in reliable circles, expenditures may well run as high as \$1,000,000 to \$2,000,000. While purchases would be made by Amtorg, the preliminary engineering work has been done through Autostroy officials who formerly had their headquarters at Ford's Rouge Plant, but recently have moved to the Schaefer Building at Michigan Avenue and Schaefer Road, Dearborn, Mich.

The collapse of NRA will not have any effect on the introduction of new models in the fall or on the staging of the New York show from Nov. 2 to 9. Initial small trial orders of steel in the new sizes for 1936 cars already have been placed by some automotive companies, although no volume buying for new lines is anticipated for about 60 days. Foreshadowing an

early start in the fall on its next year's models, Chevrolet is now in the process of negotiating 1936 parts contracts.

Automotive steel buyers disclaim any intention of attempting to break down the present price structure now that the steel code no longer has the force of law. In fact they are hesitant about expressing opinions on code matters except to say that the status quo probably will be maintained at least in the near future. The truth is that there is not likely to be a real test of steel prices by motor car companies for 30 to 60 days because practically all automobile plants have already placed orders covering their needs for present model runs. Car assemblies for June are estimated at 375,000 units.

Scrap Still Buoyant At St. Louis

ST. LOUIS, June 4.—The uncertainty which has marked the iron and steel trade for some time because of the doubt surrounding the future of the NIRA continues now that the Supreme Court has spoken so strongly nullifying the act. This uncertainty has had the effect of further slowing up business, at least until the trade can get its bearings and be assured of the maintenance of the price structure.

The State of Missouri will open bids June 7 for highway bridges requiring 700 tons of structural steel and 122 tons of reinforcing bars. Alvey Ferguson Co., Cincinnati, is low bidder on the mail-handling equipment for the St. Louis post office, involving 350 tons of structural shapes, bars and plates.

The third quarter opened quietly on the pig iron front, and no early rush of business is expected. Shipments for May were considerably less than for April, because of anticipatory action by melters prior to the emergency freight rate which became effective last month. The implement trade continues to be the brightest spot in the St. Louis territory. Washing machine and stove manufacturers show a falling off in activity. Jobbing foundries are about holding their own.

Because of a short interest in railroad springs and cast iron car-wheels, dealers have advanced prices on these items 25c. and 50c. a ton respectively. Mills in the district are said to be willing to buy, but not at prices at which dealers are willing to sell. The St. Louis-San Francisco Railway will sell a list of 50 carloads of scrap this week.

Prices of Finished Steel and Iron Products

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
F.o.b. Duluth	1.95c.
Del'd Detroit	1.95c.
F.o.b. Cleveland	1.95c.
F.o.b. Buffalo	1.90c.
Del'd Philadelphia	2.11c.
Del'd New York	2.15c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.

Rail Steel

(For merchant trade)

F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Gary	1.75c.
F.o.b. Moline, Ill.	1.75c.
F.o.b. Cleveland	1.75c.
F.o.b. Buffalo	1.80c.
F.o.b. Birmingham	1.85c.
F.o.b. cars dock Gulf ports	2.10c.
F.o.b. cars dock Pacific ports	2.25c.

Billet Steel Reinforcing

(Straight lengths as quoted by distributors)	
F.o.b. Pittsburgh	2.05c.
F.o.b. Chicago	2.10c.
F.o.b. Gary	2.10c.
Del'd Detroit	2.20c.
F.o.b. Cleveland	2.10c.
F.o.b. Youngstown	2.10c.
F.o.b. Buffalo	2.10c.
F.o.b. Birmingham	2.10c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.45c.

Rail Steel Reinforcing

(Straight lengths as quoted by distributors)	
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago	1.95c.
F.o.b. Gary	1.95c.
F.o.b. Cleveland	1.95c.
F.o.b. Youngstown	1.95c.
F.o.b. Buffalo	1.95c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	2.30c.

Iron

F.o.b. Chicago	1.80c.
F.o.b. Terre Haute, Ind.	1.75c.
F.o.b. Louisville, Ky.	1.80c.
F.o.b. Danville, Pa.	1.80c.
F.o.b. Berwick, Pa.	1.70c.

Cold Finished Bars and Shafting*

	Base per Lb.
F.o.b. Pittsburgh	1.95c.
F.o.b. Chicago	2.00c.
F.o.b. Gary	2.00c.
F.o.b. Cleveland	2.00c.
F.o.b. Buffalo	2.05c.
Del'd Detroit	2.15c.
Del'd eastern Michigan	2.20c.

* In quantities of 10,000 to 19,000 lb.

Fence and Sign Posts

Angle Line Posts

	Base per Net Ton
F.o.b. Pittsburgh	\$50.00
F.o.b. Chicago	50.00
F.o.b. Duluth	51.00
F.o.b. Cleveland	50.00
F.o.b. Birmingham	53.00
F.o.b. Houston, Orange, Beaumont, Galveston	59.00
F.o.b. Mobile	58.00
F.o.b. New Orleans, Lake Charles, Corpus Christi	59.00
F.o.b. cars dock Pacific ports	63.00

Plates

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
Del'd Cleveland	1.995c.
F.o.b. Coatesville	1.90c.
F.o.b. Sparrows Point	1.90c.
Del'd Philadelphia	1.99c.
Del'd New York	2.09c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.
Wrought iron plates, f.o.b. P'gh.	3.20c.

Floor Plates

F.o.b. Pittsburgh	3.35c.
F.o.b. Chicago	3.40c.
F.o.b. Coatesville	3.45c.
F.o.b. cars dock Gulf ports	3.75c.
F.o.b. cars dock Pacific ports	3.90c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
Del'd Cleveland	1.95c.
F.o.b. Buffalo	1.90c.
F.o.b. Bethlehem	1.90c.
Del'd Philadelphia	2.015c.
Del'd New York	2.0625c.
F.o.b. Birmingham (standard)	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.

Steel Sheet Piling

Base per Lb.

F.o.b. Pittsburgh	2.15c.
F.o.b. Chicago	2.25c.
F.o.b. Buffalo	2.25c.
F.o.b. cars dock Gulf ports	2.60c.
F.o.b. cars dock Pacific ports	2.60c.

SHEETS, STRIP, TIN PLATE

TERNE PLATE

Sheets

Hot Rolled

Base per Lb.

No. 10, f.o.b. Pittsburgh	1.85c.
No. 10, f.o.b. Gary	1.95c.
No. 10, del'd Detroit	2.05c.
No. 10, del'd Phila.	2.16c.
No. 10, f.o.b. Birmingham	2.00c.
No. 10, f.o.b. dock cars Pacific ports	2.40c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.40c.
No. 24, f.o.b. Gary	2.50c.
No. 24, del'd Detroit	2.60c.
No. 24, del'd Phila.	2.71c.
No. 24, f.o.b. Birmingham	2.55c.
No. 24, f.o.b. dock cars Pacific ports	3.05c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.50c.
No. 10 gage, f.o.b. Gary	2.60c.
No. 10 gage, del'd Detroit	2.70c.
No. 10 gage, del'd Phila.	2.81c.
No. 10 gage, f.o.b. Birmingham	2.65c.
No. 10 gage, f.o.b. dock cars Pacific ports	3.10c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.95c.
No. 20 gage, f.o.b. Gary	3.05c.
No. 20 gage, del'd Detroit	3.15c.
No. 20 gage, del'd Phila.	3.26c.
No. 20 gage, f.o.b. Birmingham	3.10c.
No. 24, f.o.b. dock cars Pacific ports	3.50c.

Galvanized Sheets

No. 24 gage, f.o.b. Pittsburgh	3.10c.
No. 24, f.o.b. Gary	3.20c.
No. 24, del'd Phila.	3.41c.
No. 24, f.o.b. Birmingham	3.25c.
No. 24, f.o.b. dock cars Pacific ports	3.70c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Ternes

No. 24, unassorted 8-lb. coating	3.40c.
f.o.b. Pittsburgh	3.50c.
F.o.b. cars dock Pacific ports	4.10c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.10c.
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Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.75c.
No. 28, Gary	2.85c.
No. 28, cars dock Pacific Coast ports	3.35c.

Tin Plate

Per Base Box

Standard cokes, f.o.b. P'gh district mill	\$5.25
Standard cokes, f.o.b. Gary	5.35
Standard cokes, f.o.b. cars dock Pacific ports	5.90

Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 40 x 28 in.)

8-lb. coating I.C.	\$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under 1/4 in.

Base per Lb.

All widths up to 24 in., P'gh.	1.85c.
All widths up to 24 in., Chicago	1.95c.
All widths up to 24 in., del'd Detroit	2.05c.
All widths up to 24 in., Birmingham	2.00c.
Cooperage stock, Pittsburgh	2.10c.
Cooperage stock, Chicago	2.20c.

Cold-Rolled Strips

Base per Lb.

F.o.b. Pittsburgh	2.60c.
F.o.b. Cleveland	2.60c.
Del'd Chicago	2.895c.
F.o.b. Worcester	2.80c.

Fender Stock

No. 14, Pittsburgh or Cleveland	2.90c.
No. 14, Worcester	3.30c.
No. 20, Pittsburgh or Cleveland	3.30c.
No. 20, Worcester	3.70c.

Hot-Rolled Rail Steel Strips

Base per Lb.

F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Birmingham	1.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade Per Lb.

Bright wire	2.30c.
Spring wire	2.90c.

Chicago prices on products sold to the manufacturing trade are \$1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are \$2 a ton above, Birmingham \$3 above, and Pacific Coast prices \$9 a ton above Pittsburgh or Cleveland.

To Jobbing Trade

Qualified jobbers are entitled to a reduction of 20c. a 100 lb. from the base price on carload shipments to stock, and of 10c. a 100 lb. on less-carload shipments to stock.

Base per 100

Standard wire nails	\$2.60
Smooth coated nails	2.60
Galvanized nails:	
15 gage and coarser	4.60
16 gage and finer	5.10

Base per 100 Lb.

Annealed fence wire	\$2.45
Galvanized fence wire	2.80
Polished staples	3.30
Galvanized staples	3.55
Barbed wire, galvanized	3.00
Woven wire fence, base column	63.00

Chicago and Anderson, Ind., mill prices are \$1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is \$2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are \$3 a ton over Pittsburgh (except for woven wire fence at Duluth which is \$3 over Pittsburgh), and Birmingham mill prices are \$3 a ton over Pittsburgh.

On wire nails, barbed wire, staples and fence wire, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are \$6 a ton over Pittsburgh, while Pacific Coast prices are \$8 over Pittsburgh. Exception: on fence wire Pacific Coast prices are \$11 a ton above Pittsburgh. On staples and barbed wire, prices of \$6 a ton above Pittsburgh are also quoted at Beaumont and Orange, Tex.

Wire Hoops, Twisted or Welded

Off List

F.o.b. Pittsburgh	35 and 2 1/2 off
F.o.b. Chicago	35 off

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio Mills

F.o.b. Pittsburgh only on wrought iron pipe

Butt Weld

Steel			Wrought Iron		
Inches	Black	Galv.	Inches	Black	Galv.
$\frac{1}{2}$	$51\frac{1}{2}$	$29\frac{1}{2}$	$\frac{1}{2}$	.....
$\frac{3}{4}$	to	$53\frac{1}{2}$	35	$\frac{3}{4}$	.....
$\frac{1}{2}$	$58\frac{1}{2}$	47	$\frac{1}{2}$	.....
$\frac{3}{4}$	62	52	$\frac{3}{4}$	.....
1 to 3	64	55	1	.....

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	70, 10 and 5
Carriage bolts	70, 10 and 5
Log bolts	70, 10 and 5
Plew bolts, Nos. 1, 2, 3 and 7	70, 10 and 5
heads	70, 10 and 5
Hot-pressed nuts, blank or tapped	70, 10 and 5
square	70, 10 and 5
Hot-pressed nuts, blank or tapped	70, 10 and 5
hexagons	70, 10 and 5
C.P.C. and t. square or hex. nuts	70, 10 and 5
blank or tapped	70, 10 and 5
Semi-finished hexagon nuts, U.S.S. and S.A.E., all sizes to and incl.	70, 10 and 5
1 in. diameter	70, 10 and 5
Larger than 1 in. diameter	70, 10 and 5
Store bolts in packages, Pittsburgh	75
Store bolts in packages, Chicago	75
Store bolts in packages, Cleveland	75
Store bolts in bulk, Pittsburgh	83
Store bolts in bulk, Chicago	83
Store bolts in bulk, Cleveland	83
Tire bolts	60 and 5

Large Rivets
(1/2-in. and larger)

F.o.b. Pittsburgh or Cleveland	\$2.90
F.o.b. Chicago	3.00
F.o.b. Birmingham	3.05

Small Rivets
(7/16-in. and smaller)

F.o.b. Pittsburgh	70 and 5
F.o.b. Cleveland	70 and 5
F.o.b. Chicago and Birmingham	70 and 5

Cap and Set Screws
(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	75 and 10
Milled standard set screws, 1 in. dia. and smaller	75 and 10
Milled headless set screws, cut thread 1/2 in. and smaller	75
Upset hex. head cap screws, U.S.S. or S.A.E. thread, 1 in. dia. and smaller	87 1/2
Upset set screw, cut and oval point	80
Milled studs	65 to 65 and 10

Alloy and Stainless Steel

Alloy Steel Ingots
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped)

\$40 per gross ton
Alloy Steel Blooms, Billets and Slabs
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Base price, \$49 a gross ton)

Alloy Steel Bars
Price del'd Detroit is \$52.

(F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton, Open-hearth grade, base)

Delivered price at Detroit is \$2.60c. S.A.E.

Series
Numbers

Differential per 100 lb.

2000 (1/2% Nickel) \$0.25

2100 (3/4% Nickel) 0.55

2200 (3/4% Nickel) 1.50

2500 (5% Nickel) 2.25

3100 Nickel Chromium 0.55

3200 Nickel Chromium 1.35

3300 Nickel Chromium 3.80

3400 Nickel Chromium 3.20

4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum) 0.50

4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum) 0.70

4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel) 1.05

5100 Chromium Steel (0.60 to 0.90 Chromium) 0.35

5100 Chromium Steel (0.80 to 1.10 Chromium) 0.45

5100 Chromium Spring Steel base 1.20

6100 Chromium Vanadium Bar 0.70

6100 Chromium Vanadium Spring Steel 1.50

Carbon Vanadium 0.95

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars is 1/2c. per lb. higher with separate extras. Blooms, billets and slabs under 4 1/2 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2 1/2 in. thick or over take the billet base. Sections 4 1/2 in. to 10 1/2 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Alloy Cold-Finished Bars
(F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo. 2.95c. base per lb.)

STAINLESS STEEL No. 302
(17 to 19% Cr. 7 to 9% Ni. 0.08 to 0.20% C.)

(Base Prices f.o.b. Pittsburgh)

Forging billets 19.55c.

Rolling slabs 15c.

Bars 23c.

Plates 26c.

Structural shapes 23c.

Sheets 23c.

Hot-rolled strip 20 3/4c.

Cold-rolled strip 27c.

Drawn wire 23c.

Raw and Semi-Finished Steel

Carbon Steel Re-rolling Ingots

(F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Uncropped) \$29 per gross ton

Carbon Steel Forging Ingots

(F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Birmingham, Uncropped) \$31 per gross ton

Billets, Blooms and Slabs

(F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Uncropped) \$27.00 per gross ton

Re-rolling \$27.00

Forging quality \$2.00

Delivered Detroit \$30.00

Forging \$35.00

Billets Only F.o.b. Duluth \$29.00

Forging \$34.00

Sheet Bars

(F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.)

Open-hearth or Bessemer \$28.00

Skelp

(F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.)

Per Lb.

Grooved 1.70c.

Universal 1.70c.

Sheared 1.70c.

Tube Rounds

Base per Lb.

F.o.b. Pittsburgh 1.80c.

F.o.b. Chicago 1.85c.

F.o.b. Cleveland 1.85c.

F.o.b. Buffalo 1.90c.

F.o.b. Birmingham 1.95c.

Wire Rods

(Common, base)

Per Gross Ton

F.o.b. Pittsburgh \$38.00

F.o.b. Cleveland 39.00

F.o.b. Chicago 39.00

F.o.b. Anderson, Ind. 39.00

F.o.b. Youngstown 39.00

F.o.b. Worcester, Mass. 40.00

F.o.b. Birmingham 41.00

F.o.b. San Francisco 47.00

F.o.b. Galveston 44.00

Pig Iron and Ferroalloys

PIG IRON

PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass.	\$18.50	\$20.00	\$19.00	\$20.50
Bethlehem, Pa.	19.50	20.00	19.00	20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Swedeland, Pa.	19.50	20.00	19.00	20.50
Steelton, Pa.	19.50	20.00	19.00	20.50
Sparrows Point, Md.	19.50	20.00	19.00	20.50
Neville Island, Pa.	18.50	18.50	18.00	19.00
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Youngstown, Pa.	18.50	18.50	18.00	19.00
Buffalo	18.50	19.00	17.50	19.50
Erie, Pa.	18.50	19.00	18.00	19.50
Cleveland	18.50	18.50	18.00	19.00
Toledo, Ohio	18.50	18.50	18.00	19.00
Jackson, Ohio	20.25	20.25	19.75	20.25
Detroit	18.50	18.50	18.00	19.00
Hamilton, Ohio	18.50	18.50	18.00	19.00
Chicago	18.50	18.50	18.00	19.00
Granite City, Ill.	18.50	18.50	18.00	19.00
Duluth, Minn.	19.00	19.00	18.50	19.50
Birmingham	14.50	14.50	13.50	19.00
Provo, Utah	17.50	17.50	17.00	17.00

DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Boston Switching District				
From Everett, Mass.	\$20.00	\$20.50	\$19.50	\$21.00
Brooklyn				
From East. Pa.	21.9289	22.4289	21.9289	22.9289
Newark or Jersey City, N. J.	20.9873	21.4873	20.4873	21.9873
Philadelphia				
From East. Pa.	20.3132	20.8132	19.8132	21.3132
Cincinnati				
From Hamilton, Ohio	19.5807	19.5807	19.0807	20.0807
Canton, Ohio				
From Cleveland and Youngstown	19.8402	19.8402	19.3402	20.3402
Columbus, Ohio				
From Hamilton, Ohio	20.64	20.64	19.64	20.64
Mansfield, Ohio				
From Cleveland and Toledo	20.3832	20.3832	19.3832	20.3832
Indianapolis				
From Hamilton, Ohio	20.0289	20.0289	19.0289	20.0289
South Bend, Ind.				
From Chicago	20.6935	20.6935	19.6935	20.6935
Milwaukee				
From Chicago	19.57	19.57	18.57	19.57
St. Paul				
From Duluth	20.94	20.94	19.94	20.94
Davenport, Iowa				
From Chicago	20.3832	20.3832	19.3832	20.3832
Kansas City				
From Granite City	21.2178	21.2178	20.2178	21.2178

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

LOW PHOSPHORUS PIG IRON

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y. \$23.50

GRAY FORGE PIG IRON

Valley furnace \$18.00

Pittsburgh district furnace 18.00

CHARCOAL PIG IRON

Lake Superior furnace \$21.00

Delivered Chicago 24.2528

Delivered Buffalo 24.57

CANADA

Pig Iron

Par gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	\$21.00
No. 2 fdy., sil. 1.75 to 2.25	20.00
Malleable	21.00

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	\$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

FERROALLOYS

Ferromanganese

(F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.)

Domestic, 80% (carload) \$35.00

Spiegeleisen

Per Gross Ton Furnace
Domestic, 19 to 21% \$28.00
50-ton lots 3-mo. shipment 24.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	\$77.50
50% (ton lots)	85.00
75% (carloads)	126.00
75% (ton lots)	136.00

Silvery Iron

(F.o.b. Jackson, Ohio, Furnace)

	Per Gross Ton	Per Gross Ton
6%	\$22.75	\$29.25
7%	23.75	30.75
8%	24.75	32.25
9%	25.75	33.75
10%	26.75	35.25
11%	27.75	36.75

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Bessemer Ferrosilicon

(F.o.b. Jackson, Ohio, Furnace)

	Per Gross Ton	Per Gross Ton
10%	\$27.75	\$33.25
11%	28.75	34.75
12%	29.25	35.75
13%	31.75	37.75

Manganese 1 1/2 to 3%, \$1 a ton additional. For each unit of manganese over 3%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 ton additional.

Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W. del., carloads \$1.35 to \$1.45

Ferrotungsten, less carloads, 1.45 to 1.55

Ferrocromium, 4 to 6% carbon and up, 85 to 70% Cr. per lb. contained Cr. delivered, in carloads 10.00c.

Ferrocromium, 2% carbon 16.50c. to 17.00c.

Ferrocromium, 1% carbon 17.50c. to 18.00c.

Ferrocromium, 0.10% carbon 19.50c. to 20.00c.

Ferrocromium, 0.06% carbon 20.00c. to 20.50c.

Ferrovandium, del. per lb. contained V. \$2.70 to \$2.90

Ferrocobaltititanium, 15 to 18% Ti, 6 to 8% C. f.o.b. furnace carload and contract per net ton, \$137.50

Ferronphosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with \$2 unitage 50.00

Ferronphosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton with \$2.75 unitage 65.00

Ferronmolybdenum, per lb. Mo., del. 95c.

Calcium molybdate, per lb. Mo., del. 80c.

Silico spiegel, per ton, f.o.b. furnace, car lots \$38.00

Ton lots or less per ton 45.50

Silico-manganese, gross ton, delivered:

2.50% carbon grade 90.00

2% carbon grade 95.00

1% carbon grade 105.00

Spot prices \$5 a ton higher

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	\$11.50 to \$12.00
No. 2 heavy melting steel	10.00 to 10.50
No. 2 railroad wrought	11.50 to 12.00
Scrap rails	13.00 to 13.50
Scrap rails, 3 ft. and under	13.50 to 14.00
Compressed sheet steel	11.25 to 11.75
Hand bundled sheet steel	10.00 to 10.50
Hy. steel axle turnings	10.00 to 10.50
Machine shop turnings	8.50 to 9.00
Short shov. turnings	8.50 to 9.00
Short mixed borings and turnings	6.25 to 6.75
Cast iron borings	6.25 to 6.75
Cast iron car wheels	12.00 to 12.50
Heavy breakable cast	11.50 to 12.00
No. 1 cast	13.00 to 13.50
Railr. knuckles and couplers	14.25 to 14.75
Rail, coil and leaf springs	14.25 to 14.75
Rolled steel wheels	14.25 to 14.75
Low phos. billet crops	15.00 to 15.50
Low phos. sheet bar crops	14.25 to 14.75
Low phos. plate scrap	14.00 to 14.50
Low phos. punchings	14.00 to 14.50
Steel car axles	14.25 to 14.75

CHICAGO

Delivered Chicago district consumers:

Per Gross Ton	
Heavy melting steel	\$10.00 to \$10.50
Automobile hy. melt. steel	9.00 to 9.50
Shoveling steel	10.00 to 10.50
Hydraulic comp. sheets	8.75 to 9.25
Drop forge flashings	7.50 to 8.00
No. 1 busheling	8.25 to 8.75
Rolled car wheels	11.00 to 11.50
Railroad ties	11.50 to 12.00
Railroad leaf springs	10.50 to 11.00
Axle turnings	9.00 to 9.50
Steel couplers and knuckles	11.00 to 11.50
Coil springs	12.00 to 12.50
Axle turnings (elec. fur.)	9.50 to 10.00
Low phos. punchings	13.00 to 13.50
Low phos. plates, 12 in. and under	13.00 to 13.50
Cast iron borings	5.00 to 5.50
Short shoveling turnings	5.50 to 6.00
Machine shop turnings	5.00 to 5.50
Revolving rails	11.00 to 11.50
Steel rails, less than 3 ft.	12.00 to 12.50
Steel rails, less than 2 ft.	13.00 to 13.50
Angle bars, steel	12.50 to 13.00
Cast iron car wheels	10.50 to 11.00
Railroad malleable	13.00 to 13.50
Agricultural malleable	9.50 to 10.00

Per Net Ton	
Iron car axles	\$14.50 to \$15.00
Steel car axles	13.00 to 13.50
No. 1 railroad wrought	8.00 to 8.50
No. 2 railroad wrought	8.50 to 9.00
No. 2 busheling	4.50 to 5.00
Locomotive tires, smooth	10.00 to 10.50
Pine and fuses	5.00 to 5.50
No. 1 machinery cast	9.00 to 9.50
Clean automobile cast	8.50 to 9.00
No. 1 railroad cast	8.00 to 8.50
No. 1 agricultural cast	8.00 to 8.50
Store plate	6.00 to 6.50
Grate bars	5.50 to 6.00
Brake shoes	6.00 to 6.50

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	\$9.50 to \$10.50
No. 2 heavy melting steel	8.50 to 9.50
No. 1 railroad wrought	10.00 to 10.50
Bundled sheets	9.50 to 10.00
Hydraulic compressed, new	9.50 to 10.00
Hydraulic compressed, old	7.00 to 7.50
Machine shop turnings	5.50 to 6.00
Heavy axle turnings	8.50 to 9.00
Cast borings	5.00 to 5.50
Store plate (steel works)	8.00 to 8.25
Heavy breakable cast	10.50 to 11.00
No. 1 low phos. heavy	13.75 to 14.25
Couplers and knuckles	13.50 to 14.00
Rolled steel wheels	13.50 to 14.00
No. 1 blast furnace	4.75 to 5.00
Spec. iron and steel pipe	8.00 to 8.50
Shafting	17.00
Steel axles	16.00
No. 1 forge fire	9.50 to 10.00
Cast iron car wheels	11.00 to 11.50
No. 1 cast	11.00 to 11.50
Cast borings (chem.)	12.00 to 14.00
Steel rails for rolling	12.00 to 12.50

* Brokers' buying price for export.

CINCINNATI

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	\$8.00 to \$8.50
No. 2 heavy melting steel	6.50 to 7.00
Scrap rails for melting	8.00 to 8.50
Loose sheet clippings	4.50 to 5.00
Bundled sheets	4.50 to 5.00
Cast iron borings	4.50 to 5.00
Machine shop turnings	4.50 to 5.00
No. 1 busheling	6.00 to 6.50
No. 2 busheling	2.75 to 3.25
Rails for rolling	9.00 to 9.50
No. 1 locomotive tires	7.25 to 7.75
Cast iron car wheels	11.50 to 12.00
No. 1 machinery cast	8.00 to 8.50
No. 1 railroad cast	8.50 to 9.00
Burnt cast	6.00 to 6.50
Store plate	6.00 to 6.50
Agricultural malleable	8.00 to 8.50
Railroad malleable	9.00 to 9.50

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	\$10.00 to \$10.50
No. 2 heavy melting steel	9.50 to 10.00
Compressed sheet steel	9.75 to 10.25
Light bundled sheet stampings	8.00 to 8.50
Drop forge flashings	9.50 to 10.00
Machine shop turnings	6.25 to 6.75
Short shoveling turnings	6.50 to 7.00
No. 1 busheling	9.50 to 10.00
Steel axle turnings	9.50 to 10.00
Low phos. billet crops	14.00 to 14.50
Cast iron borings	6.50 to 7.00
Mixed borings and short turnings	6.50 to 7.00
No. 2 busheling	6.50 to 7.00
No. 1 cast	11.50 to 12.00
Railroad grate bars	7.00 to 7.50
Store plate	7.50 to 8.00
Rails under 3 ft.	14.00 to 14.50
Rails for rolling	15.50 to 16.00
Railroad malleable	13.50 to 14.00
Cast iron car wheels	10.75 to 11.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	\$11.00
No. 2 heavy melting scrap	10.00
Scrap rails	11.00
New hydraulic comp. sheets	10.00
Old hydraulic comp. sheets	9.00
Drop forge flashings	10.00
No. 1 busheling	8.00 to 8.50
Hy. steel axle turnings	8.00 to 8.50
Machine shop turnings	4.50 to 5.00
Knuckles and couplers	11.50 to 12.00
Coil and leaf springs	11.50 to 12.00
Rolled steel wheels	11.50 to 12.00
Low phos. billet crops	12.00 to 12.50
Short shov. steel turnings	6.00 to 6.50
Short mixed borings and turnings	6.00 to 6.50
Cast iron borings	6.00 to 6.50
No. 2 busheling	6.50
Steel car axles	11.50 to 12.00
Iron axles	11.50 to 12.00
No. 1 machinery cast	11.50 to 12.50
No. 1 cupola cast	10.50 to 11.00
Store plate	9.00 to 9.50
Steel rails, 3 ft. and under	12.50 to 13.00
Cast iron car wheels	11.00 to 11.50
Industrial malleable	12.00 to 13.00
Railroad malleable	12.00 to 13.00
Chemical borings	8.00 to 8.50

BOSTON

Dealers' buying prices per gross ton:

*No. 1 heavy melting steel	\$8.50
No. 1 heavy melting steel	\$6.15 to 6.65
*Scrap T rails	8.50 to 8.75
Scrap rails	6.40 to 6.65
No. 2 steel	7.50
No. 15 steel	6.50
Breakable cast	5.00 to 5.50
Machine shop turnings	2.40 to 2.50
*Machine shop turnings (short)	4.25 to 4.50
Bundled skeleton, long	5.05 to 5.30
Forge flashings	5.00 to 5.50
Shafting	11.75 to 12.00
Steel car axles	11.50 to 12.00
Cast iron borings, chemical	6.50 to 7.00
*Store plate	6.25 to 6.50

Per gross ton delivered consumers' yards:

Textile cast	\$9.00 to \$9.50
No. 1 machinery cast	9.00 to 9.50
Store plate	6.00 to 6.50
Railroad malleable	11.00 to 11.50

* Delivered local army base.

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	\$7.00 to \$7.50
No. 2 heavy melting steel	6.50 to 7.00
Heavy breakable cast	6.25 to 6.75
No. 1 machinery cast	7.00 to 7.50
No. 2 cast	6.25
Store plate	6.25
Steel car axles	13.50 to 14.00
No. 1 railroad wrought	7.00 to 7.50
No. 1 yard wrought, long	6.00 to 6.50
Spec. iron and steel pipe	4.50 to 5.00
Forge fire	5.50 to 6.00
Rails for rolling	8.50 to 9.00
Short shoveling turnings	2.00 to 2.50
Machine shop turnings	2.00 to 2.50
Cast borings	3.50 to 3.75
No. 1 blast furnace	2.00 to 2.50
Cast borings (chemical)	11.00 to 11.50
Unprepared yard iron and steel	4.00 to 4.50

Per gross ton, delivered local foundries:

No. 1 machinery cast	\$10.00
No. 1 hy. cast (cupola)	9.00
No. 2 cast	7.50

* For direct car loading only.
† Loading on barge.

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	\$9.00 to \$9.50
Scrap steel rails	10.00 to 10.50
Short shoveling turnings	7.00
Store plates	7.00
Steel axles	11.50
Iron axles	11.50
No. 1 railroad wrought	7.00
Rails for rolling	12.50
No. 1 cast	9.50 to 10.00
Tramcar wheels	10.00

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	\$8.75 to \$9.25
No. 1 heavy melting	8.25 to 8.75
No. 2 heavy melting	7.50 to 8.00
No. 1 locomotive tires	9.75 to 10.25
Misc. stand-sec. rails	9.75 to 10.25
Railroad springs	11.00 to 11.50
Bundled sheets	6.00 to 6.50
No. 2 railroad wrought	8.25 to 8.75
No. 1 busheling	5.00 to 5.50
Cast iron borings and shoveling turnings	3.00 to 3.50
Rails for rolling	10.00 to 10.50
Machine shop turnings	2.75 to 3.25
Heavy turnings	5.50 to 6.00
Steel car axles	12.50 to 13.00
Iron car axles	15.00 to 16.00
No. 1 railroad wrought	6.00 to 6.50
Steel rails less than 3 ft.	11.50 to 12.00
Steel angle bars	9.50 to 10.00
Cast iron car wheels	8.00 to 8.50
No. 1 machinery cast	8.50 to 9.00
Railroad malleable	10.50 to 11.00
No. 1 railroad cast	8.00 to 8.50
Store plate	6.50 to 7.00
Agricult. malleable	8.50 to 9.00

DETROIT

Dealers' buying prices per gross ton:

Heavy melting steel	\$7.50 to \$8.00
Borings and short turnings	4.25 to 4.75

ORES, FLUORSPAR, COKE, FUEL, REFRACTORIES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton	
Old range, Bessemer, 51.50% iron	\$4.80
Old range, non-Bessemer, 51.50% iron	4.85
Mesabi, Bessemer, 51.50% iron	4.85
Mesabi, non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore

C.A.F. Philadelphia or Baltimore

Per Unit	
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algeria	9.50c.
Iron, low phos., Swedish, average 68 1/2% iron	9.50c.
Iron, basic or foundry, Swedish, aver. 65% iron	9c.
Iron, basic or foundry, Russian, aver. 65% iron	9c.
Manganese, Caucasian, washed 52% manganese, African, Indian, 44-48%	20c.
Manganese, African, Indian, 49-51%	24c.
Manganese, Brazilian, 46 to 48 1/2%	20c.

Per Net Ton Unit	
Tungsten, Chinese, wolframite, duty paid, delivered	\$17.50 to \$18.50
Tungsten, domestic, scheelite, delivered	11.00

Per Gross Ton

Chrome, 45%, Cr ₂ O ₃ , crude, c.i.f. Atlantic Seaboard	\$17.00
Chrome, 48%, Cr ₂ O ₃ , c.i.f. Atlantic Seaboard	20.00

* Quotations nominal in absence of sales.
† Nominal; no supplies available.

Fluorspar

Per Net Ton	
Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines for all-rail shipment	\$13.00
Same grade for Ohio River barge shipment for Kentucky and Illinois River landings	16.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	14.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	19.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines	30.00

COKE, COAL AND FUEL OIL

Coke

Per Net Ton	
Furnace, f.o.b. Connellsville	\$3.85
Foundry, f.o.b. Connellsville	4.60 to 5.10
Foundry, by-product, Chicago ovens, for delivery outside switching district	8.50
Foundry, by-product, delivered in Chicago switching district	9.25
Foundry, by-product, New England, delivered	11.00
Foundry, by-product, Newark or Jersey City, c.i.f.	9.24 to 9.72
Foundry, by-product, Phila.	9.03

Long turnings	\$4.00 to \$4.50
No. 1 machinery cast	11.00 to 11.50
Automotive cast	11.25 to 11.75
Hydraulic comp. sheets	8.25 to 8.75
Store plate	6.50 to 7.00
New factory busheling	6.75 to 7.25
Old No. 2 busheling	3.75 to 4.25
Sheet clippings	5.00 to 5.50
Flashings	7.50 to 8.00
Low phos. plate scrap	7.75 to 8.25

CANADA

Dealers' buying prices per gross ton:

Toronto Montreal	
Heavy melting steel	\$7.00 \$7.00
Rails scrap	8.00 8.00
Machine shop turnings	3.00 3.00
Boiler plate	4.50 4.50
Heavy axle turnings	4.50 4.00
Cast borings	4.00 3.50
Steel borings	2.00 2.00
Wrought pipe	3.50 3.50
Steel axles	7.00 8.00
Axles, wrought iron	7.00 8.00
No. 1 machinery cast	9.00 9.00
Store plate	5.50 5.00
Standard car wheels	7.25 7.00
Malleable	6.75 7.00

Foundry, by-product, Cleveland, delivered	\$9.25
Foundry, Birmingham	6.90
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

Per Net Ton	
Mine run steam coal, f.o.b. W. Pa. mines	\$1.80 to \$2.05
Mine run coking coal, f.o.b. W. Pa. mines	2.05 to 2.25
Gas coal, 1/2-in., f.o.b. Pa. mines	2.25 to 2.55
Mine run gas coal, f.o.b. Pa. mines	2.05 to 2.45
Steam slack, f.o.b. W. Pa. mines	1.55 to 1.65
Gas slack, f.o.b. W. Pa. mines	1.90 to 2.10

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. f.o.b. Baltimore	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. del'd Chicago	
No. 3 industrial fuel oil	3.88c.
No. 5 industrial fuel oil	3.58c.
Per Gal. f.o.b. Cleveland	
No. 3 distillate	5.50c.
No. 4 industrial	5.25c.
No. 5 industrial	4.25c.

REFRACTORIES

Fire Clay Brick

Per 1000 f.o.b. Works	
High-heat intermediate Duty Brick	Duty Brick
Pennsylvania	\$45.00
Maryland	45.00
New Jersey	45.00
Ohio	45.00
Kentucky	45.00
Missouri	45.00
Illinois	45.00
Ground fire clay, per ton	7.00

Silica Brick

Per 1000 f.o.b. Works	
Pennsylvania	\$45.00
Chicago District	54.00
Birmingham	55.00
Silica clay, per net ton	8.00

Chrome Brick

Per Net Ton	
Standard, f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	\$45.00
Chemically Bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	42.50

Warehouse Prices for Steel Products

PITTSBURGH

	Base per Lb.
Plates	3.15c
Structural shapes	3.15c
Soft steel bars and small shapes	2.90c
Reinforcing steel bars	2.90c
Cold-finished and screw stock:	
Rounds and hexagons	3.20c
Squares and flats	3.20c
Hoops and bands under 1/4 in.	3.20c
Hot-rolled annealed sheets (No. 24)	3.20c
25 or more bundles	3.30c
Galv. sheets (No. 24), 25 or more	3.30c
bundles	3.35c
Hot-rolled sheets (No. 10)	3.25c
Galv. corrug. sheets (No. 28), per	2.95c
square (more than 3750 lb.)	\$3.69
Spikes, large	2.90c
Track bolts, all sizes, per 100 count,	65 per cent off list.
Machine bolts, 100 counts,	65 per cent off list.
Carriage bolts, 100 count,	65 per cent off list.
Nuts, all styles, 100 count,	65 per cent off list.
Large rivets, base per 100 lb.	\$3.50
Wire, black, soft ann'd, base per	100 lb. \$2.70
Wire, galv. soft, base per 100 lb.	\$2.95
Common wire nails, per keg	\$2.834
Cement coated nails, per keg	\$2.834

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 9999 lb.
*Delivered in Pittsburgh switching district.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.20c
Soft steel bars	2.95c
Cold-fn. steel bars:	
Rounds and hexagons	3.35c
Flats and squares	3.35c
Hot-rolled strip	3.30c
Hot-rolled annealed sheets (No. 24)	3.35c
Galv. sheets (No. 24)	4.35c
Hot-rolled sheets (No. 10)	3.05c
Spikes (keg lots)	3.50c
Track bolts (keg lots)	4.65c
Rivets, structural (keg lots)	3.65c
Rivets, boiler (keg lots)	3.75c
Machine bolts	70
Carriage bolts	70
Lag screws	70
Hot-pressed nuts, sq. tap. or	70
Hot-pressed nuts, hex. tap or blank..	70
Hot-pressed nuts, hex. tap or blank..	70
Hex. head cap screws	80
Cut point set screws	70 and 10
Flat head bright wood screws 37 1/2 and 10	50
Spring cotters	50
Store bolts in full packages	70
Rd. hd. tank rivets, 7/16 in. and	57 1/2
smaller	\$4.50 off list
Wrought washers	\$4.50 off list
Black ann'd wire per 100 lb.	\$3.85
Com. wire nails, base per keg	2.95
Cement c'd nails, base per keg	2.95

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. All prices are f.o.b. consumers' plants within the Chicago switching district.
*These are quotations delivered to city trade for quantities of 100 lb. or more. For lots of less than 100 lb., the quotation is 85 per cent off. Discounts applying to country trade are 70 per cent off, f.o.b. Chicago, with full or partial freight allowed up to 50c. per 100 lb.
†Prices for city and suburbs only.

NEW YORK

	Base per Lb.
Plates, 1/4 in. and heavier	3.40c
Structural shapes	3.37c

Soft steel bars, small shapes	3.26c
Iron bars	3.26c
Iron bars, swed. charcoal	6.50c
Cold-fn. shafting and screw stock:	
Rounds and hexagons	3.81c
Flats and squares	4.31c
Cold-rolled; strip, soft and quarter	3.36c
hard	3.36c
Hoops	3.56c
Bands	3.56c
Hot-rolled sheet (No. 10)	3.31c
Hot-rolled ann'd sheets (No. 24)	3.89c
Galvanized sheets (No. 24)	4.30c
Long term sheets (No. 24)	5.20c
Standard tool steel	11.00c
Wire, black annealed (No. 10)	3.40c
Wire, galv. (No. 10)	3.75c
Tire steel, 1 x 1/4 in. and larger	3.65c
Open hearth spring steel, 4.00c to 10.00c	
Common wire nails, base, per keg	\$3.21
Machine bolts, cut thread:	Off List
All diameters	65 and 10
Carriage bolts, cut thread:	Off List
All diameters	65 and 10
Boiler tubes:	Per 100 Ft.
Lap welded, 2-in.	\$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.44c
Bars, soft steel or iron	3.19c
Cold-fn. rounds, shafting, screw	3.74c
Hot-rolled annealed sheets (No. 24)	4.09c
Galv. sheets (No. 24)	4.64c
Hot-rolled sheets (No. 10)	3.29c
Black corrug. sheets (No. 24)	4.09c
Galv. corrug. sheets	4.64c
Structural rivets	3.95c
Boiler rivets	4.09c
Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws	fittings up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts:
All quantities	70

*No. 26 and lighter take special prices.

PHILADELPHIA

	Base per Lb.
*Plates, 1/4-in. and heavier	2.98c
*Structural shapes	2.98c
*Soft steel bars, small shapes, iron	2.93c
bars (except bands)	2.93c
*Reinforc. steel bars, sq. twisted	2.96c
and deformed	3.61c
*Cold-finished steel bars	3.43c
*Steel hoops	3.18c
*Steel bands, No. 12 and 3/16 in.	3.18c
incl.	5.00c
Spring steel	5.00c
*Hot-rolled anneal. sheets (No. 24)	3.65c
*Galvanized sheets (No. 24)	4.30c
*Hot-rolled annealed sheets (No. 10)	3.08c
Diam. pat. floor plates, 1/4 in.	4.95c
Swedish iron bars	6.25c

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.
*Base prices subject to deduction on orders aggregating 4000 lb. or over.
†For 50 bundles or over.
‡For less than 2000 lb.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.31c
Soft steel bars	2.95c

Reinforc. steel bars	2.10c
Cold-finished steel bars	3.25c
Flat-rolled steel under 1/4 in.	3.36c
Cold-finished strip	\$3.00c
Hot-rolled annealed sheets (No. 24)	3.96c
Galvanized sheets (No. 24)	4.61c
Hot-rolled sheets (No. 10)	3.11c
Hot-rolled 3/16 in. 24 to 48 in. wide	3.56c
sheets	\$2.65
Black ann'd wire, per 100 lb.	\$2.65
No. 9 galv. wire, per 100 lb.	\$3.00
Com. wire nails, base per keg	2.40

†Outside delivery 10c. less.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.17c
Bars, soft steel or iron	3.17c
New billet reinforc. bars	3.25c
Rail steel reinforc. bars	3.25c
Hoops and bands, 3/16 in. and	3.47c
Cold-finished bars	3.57c
Hot-rolled annealed sheets (No. 24)	4.02c
Galv. sheets (No. 24)	4.72c
Hot-rolled sheets (No. 10)	3.22c
Structural rivets	4.35c
Small rivets	55 per cent off list
No. 9 ann'd wire, per 100 lb. (1000	lb. or over)
Com. wire nails, base per keg:	\$2.88
Any quantity less than carload	3.04
Cement c'd nails, base 100-lb. keg	3.50
Chain, 1-in., per 100 lb.	8.35
Seamless steel boiler tubes, 2-in.	\$21.47
4-in.	51.19
Lap-welded steel boiler tubes, 2-in.	20.62
4-in.	48.19

BUFFALO

	Base per Lb.
Plates	3.37c
Struc. shapes	3.25c
Soft steel bars	3.00c
Reinforcing bars	2.40c
Cold-fn. flats and sq.	3.53c
Round and hex.	3.53c
Cold-rolled strip steel	3.19c
Hot-rolled annealed sheets (No. 24)	4.03c
Heavy hot-rolled sheets, 3/16 in.,	3.82c
24 to 48 in. wide	4.70c
Galv. sheets (No. 24)	3.42c
Bands	3.42c
Hoops	3.42c
Hot-rolled unannealed sheets	3.17c
Com. wire nails, base per keg	\$3.35
Black wire, base per 100 lb.	3.55

BOSTON

	Base per Lb.
Reams, channels, angles, tees, zees	3.54c
H beams and shapes	3.54c
Plates—sheered, tank and univ. mill,	3.56c
1/4 in. thick and heavier	3.56c
Floor plates, diamond pattern	3.56c
Bar and bar shapes (mild steel)	3.35c
Bands 3/16 in. thick and	3.65c
No. 12 ga. incl.	3.65c to 4.65c
Half rounds, half ovals, ovals and	4.60c
bevels	4.60c
Tire steel	4.60c
Cold-finished strip steel	3.245c
Cold-finished rounds, squares and	3.90c
hexagons	3.75c
Cold-finished flats	3.65c
Blue annealed sheets, No. 10 ga.	4.20c
One pass cold-rolled sheets No. 24	4.90c
ga.	5.85c
Galvanized sheet sheets, No. 24 ga.	5.85c
Lead coated sheets, No. 24 ga.	5.85c

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.

DETROIT

	Base per Lb.
Soft steel bars	3.04c
Structural shapes	3.42c
Plates	3.42c
Floor plates	3.17c
Hot-rolled annealed sheets (No. 24)	3.94c
Hot-rolled sheets (No. 10)	3.14c
Galvanized sheets (No. 24)	4.72c
Bands	3.39c
Hoops	3.39c
Cold-finished bars	3.49c
Cold-rolled strip	3.18c
Hot-rolled alloy steel (S.A.E. 3100	5.20c*
Series)	5.20c*
Bolts and nuts	70 and 5 per cent off list

Prices delivered by truck in metropolitan Detroit, subject to quantity differentials.
* Price applies to 1,000 lb. and over.

MILWAUKEE

	Base per Lb.
Plates and structural shapes	3.31c
Soft steel bars	3.06c
Hot-rolled strip	3.41c
Hot-rolled sheets (No. 10)	3.16c
Hot-rolled annealed sheets (No. 24)	3.96c
Galvanized sheets (No. 24)	4.66c
Cold-finished steel bars	3.61c
Cold-rolled strip	3.30c
Structural rivets (keg lots)	3.88c
Boiler rivets (keg lots)	3.96c
Track spikes (keg lots)	3.71c
Track bolts (keg lots)	4.80c
Black annealed wire	3.10c
Com. wire nails	2.90c
Cement coated nails	2.90c
Machine bolts	70
Carriage bolts	70
Hot-pressed nuts, sq. and hex., tapped	70
or blank (keg lots)	70

Prices given above are delivered Milwaukee.
On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on order of 400 to 3499 lb. On cold-finished bars the prices are for orders of 300 to 499 lb.

PACIFIC COAST

	San Francisco	Los Angeles	Seattle
Plates, tank and	3.55c	3.60c	3.55c
U. M.	3.55c	3.60c	3.55c
Shapes, standard	3.55c	3.60c	3.55c
Soft steel bars	3.60c	3.60c	3.60c
Reinforcing bars, f.o.b. cars dock	2.45c	2.45c	2.45c
Pacific ports	2.45c	2.45c	2.45c
Hot rolled annealed sheets (No. 24)	4.40c	4.35c	4.40c
Hot-rolled sheets (No. 10)	3.75c	3.70c	3.75c
Galv. sheets (No. 24)	5.00c	4.95c	5.00c
Cold finished steel:			
Rounds	5.95c	5.85c	6.00c
Squares and hexagons	7.20c	7.10c	7.25c
Flats	7.70c	7.60c	8.25c
Common wire nails			
—base per keg			
less carload	\$3.30	\$3.40	\$3.30

All items subject to differentials for quantity.

TOOL STEEL

Prices are same for warehouse distribution at all points on or East of Mississippi River. West of Mississippi quotations are 1c. a lb. higher.

	Base per Lb.
High speed	57c
High carbon chrome	37c
Oil hardening	22c
Extra	17c
Regular	14c

Weekly Indications of Steel Activity

From THE IRON AGE

	June 4, 1935	May 28, 1935	May 7, 1935	June 5, 1934	Average, Year to Date 1935	1934
Steel ingot operations—Per cent of capacity	41.5	42.5	45.5	60.0	47.4	47.3
	June 4, 1935	May 28, 1935	May 7, 1935	June 5, 1934	Year to Date 1935	1934
Fabricated structural steel awards	5,700	6,250	10,200	29,825	289,438	373,420
Fabricated plate awards	5,600	2,175	1,520	1,675	47,667	51,152
Sheet steel piling awards	0	2,150	0	0	22,145	20,820
Reinforcing bar awards	2,455	5,040	2,040	4,150	100,225	93,720

Lead Price Trend Reversed with Two Reductions Amounting to \$5 a Ton

Copper Firm at 9c a Lb., with No Change in Industry's Operating Procedure—Zinc Price Maintained—Tin Weaker

NEW YORK, June 4.—Following a meeting of the copper industry last week at which it was decided to make no changes in the status or procedure under which the industry has been operating, the market has been very quiet. While the code is no longer effective, the 9c. a lb. price appears to be holding and has been tested on numerous transactions. May bookings amounted to 27,416 tons, compared with 26,690 tons in April and with 32,300 tons in March, the only month in which the "book" set up under the code was reached. Transactions on Saturday and Monday, however, were extremely light, having totaled only slightly

over 200 tons. Uncertainty over the trend of prices has naturally led buyers to pursue a cautious policy, and the situation has been reflected in the European market where quotations on electrolytic copper have declined steadily over the past week to 7.90c. to 8c. a lb., usual Continental base ports, this morning.

Tin

The tin market has reflected the dullness of the other non-ferrous metals since the Supreme Court decision ending the NRA, even though it was the least affected by the move. Buyers of tin are apparently so concerned over the

problems confronting their own industries that they have no time to give to forward purchases, even though no marked change in quotations is likely. Tin deliveries in May amounted to 3950 tons, compared with 5825 tons in the preceding month and with 4110 tons in May, 1934. The International Tin Committee will meet on June 12 to fix quotas for the forthcoming quarter and an increase of 5 to 10 per cent is expected. Prices of Straits metal have tended slightly lower during the week, largely because of fluctuations in sterling exchange. The price today was 51c. a lb. At London this morning standard tin was quoted at £226 15s. for spot, and £221 5s. for futures. Straits metal was holding at £234 15s. and the price in the East was £228 10s.

Lead

The lessening of consumer interest late in the week led the American Smelting & Refining Co. to reduce its contract price on lead \$2 a ton on Friday, to 4.25c. a lb., New York, and 4.10c., St. Louis. The move was not followed by the leading interest, but when the American company made a further cut of \$3 a ton on Monday, the St. Joseph Lead Co. reduced its quotations to 4.05c., St. Louis, and 4.20c., New York. This company is largely booked through June and is taking little tonnage at the higher figures, as the general market is quotable at \$2 a ton less. The statistical position remains favorable as May is expected to reveal another drop in lead stocks.

Zinc

The market continues quiet, but the recent quotations of 4.30c., East St. Louis, and 4.67½c., New York, appear to be well maintained. One or two instances of shading have been reported but significant tonnages were not involved. Sales last week declined sharply to 2400 tons including 1800 tons of Prime Western. In the preceding week, transactions amounted to 7500 tons compared with 9000 tons in the week before.

Non-Ferrous Averages

The average prices of the major non-ferrous metals for May, based on daily quotations in THE IRON AGE, are as follows:

	Average
Electrolytic copper, N. Y.†	8.75c. a lb.
Lake copper, Eastern delivery	9.12½c. a lb.
Straits tin, spot, N. Y.	51.095c. a lb.
Zinc, East St. Louis	4.22½c. a lb.
Zinc, New York	4.60c. a lb.
Lead, St. Louis	3.81c. a lb.
Lead, New York	3.96c. a lb.

†Price ¼c. higher in Connecticut Valley.

The Week's Prices. Cents Per Pound for Early Delivery

	May 29	May 31	June 1	June 3	June 4
Electrolytic copper, N. Y.*	8.75	8.75	8.75	8.75	8.75
Lake copper, N. Y.	9.12½	9.12½	9.12½	9.12½	9.12½
Straits tin, spot, New York	51.37½	51.50	51.50	51.25	51.00
Zinc, East St. Louis	4.30	4.30	4.30	4.30	4.30
Zinc, New York†	4.67½	4.67½	4.67½	4.67½	4.67½
Lead, St. Louis	4.20	4.10	4.10	3.95	3.95
Lead, New York	4.35	4.25	4.25	4.10	4.10

*Refinery quotations; price ¼c. higher delivered in Connecticut.

†Includes emergency freight charge.

Aluminum, virgin 99 per cent plus, 19c. to 21c. a lb., delivered.
Aluminum, No. 12 remelt, No. 2 standard, in carlots, 16.25c. a lb., delivered.
Nickel, electrolytic, 35c. to 36c. a lb., base refinery, in lots of 2 tons or more.
Antimony, Asiatic, 12.75c. a lb., New York.
Brass ingots, commercial 85-5-5-5, 8c. a lb., delivered; in Middle West ¼c. a lb. is added on orders for less than 40,000 lb.

From New York Warehouse

Delivered Prices, Base per Lb.	
Tin, Straits pig.....	52.25c. to 53.25c.
Tin, bar.....	54.25c. to 55.25c.
Copper, Lake.....	10.25c. to 11.00c.
Copper, electrolytic.....	10.00c. to 10.50c.
Copper, castings.....	9.75c. to 10.75c.
*Copper sheets, hot-rolled.....	16.00c.
*High brass sheets.....	14.25c.
*Seamless brass tubes.....	16.00c.
*Seamless copper tubes.....	16.25c.
*Brass rods.....	12.75c.
Zinc, slabs.....	5.75c. to 6.75c.
Zinc, sheets (No. 9), casks, 1200 lb. and over.....	10.25c.
Lead, American pig.....	4.62½c. to 5.62½c.
Lead, bar.....	5.62½c. to 6.62½c.
Lead, sheets.....	8.00c.
Antimony, Asiatic.....	15.50c. to 16.50c.
Alum., virgin, 99 per cent, plus.....	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent.....	18.00c. to 19.00c.
Solder, ½ and ⅓.....	30.00c. to 31.00c.
Babbitt metal, commercial grades.....	25.00c. to 60.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.	
Tin, Straits pig.....	55.25c.
Tin, bar.....	57.25c.

Copper, Lake	10.00c.
Copper, electrolytic	10.00c.
Copper, castings	9.75c.
Zinc, slabs	5.75c. to 6.00c.
Lead, American pig	4.75c. to 5.50c.
Lead, bar	8.25c.
Antimony, Asiatic	15.75c.
Babbitt metal, medium grade	19.25c.
Babbitt metal, high grade	59.25c.
Solder, ½ and ⅓	32.50c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy, crucible	6.12½c.	6.87½c.
Copper, hvy. and wire	6.00c.	6.50c.
Copper, light and bottoms	5.00c.	5.50c.
Brass, heavy	3.37½c.	4.00c.
Brass, light	2.62½c.	3.37½c.
Hvy. machine composition	4.87½c.	5.37½c.
No. 1 yel. brass turnings	4.37½c.	4.87½c.
No. 1 red brass or compos. turnings	4.62½c.	5.12½c.
Lead, heavy	2.87½c.	3.25c.
Zinc	2.25c.	2.62½c.
Cast aluminum	10.62½c.	11.75c.
Sheet aluminum	12.00c.	13.50c.

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served in various capacities in the sales and order departments.

♦ ♦ ♦

WALTER F. BACHELDER, general sales manager and secretary of the Holyoke, Mass., wire mill of George W. Prentice Co., died on May 23 after a short illness. He was a native of Maine, but had lived in Holyoke most of his life.

♦ ♦ ♦

CHARLES J. DAVIDSON, mechanical engineer and designer of steam generating plants, died at his home in Milwaukee on May 26, aged 67 years. Early in his career he joined the Milwaukee Electric Railway & Light Co., of which he was made chief engineer in 1909. He resigned in 1915 to engage in consulting engineering at Chicago, and retired in 1930 because of failing health. Mr. Davidson was a member of the American Society of Mechanical Engineers and one of the organizers of its Milwaukee Section, being among its early presidents.

♦ ♦ ♦

EARLE W. GARDNER, for many years purchasing agent of the York Ice Machinery Corp., York, Pa., died on May 23, aged 62 years.

♦ ♦ ♦

R. T. MCGLYNN, for 14 years vice-president of the Merchants Steel & Supply Co., Chicago, died on May 26, aged 40 years. He had served the company for 21 years.

♦ ♦ ♦

ERIC JOHNSON, president of the Johnson Mfg. Co., Seattle, Wash., maker of Diesel engines, died at his home in that city at the age of 73 years.

♦ ♦ ♦

ARTHUR J. TOWNSEND, vice-president of Rotary Electric Steel Co., Detroit, died at Harper Hospital in that city on June 1, following a brief illness. Born in Apollo, Pa., in 1888, Mr. Townsend in association with H. M. Naugel and K. R. Jenson organized the National Pressed Steel Co. at Massillon, Ohio, in 1916, to manufacture hot-rolled strip steel, all three men having been with the Berger Mfg. Co. at Canton. In 1922 the Central Steel Corp. acquired the National Pressed Steel Co. and the same year Messrs. Townsend, Naugel and Jenson bought the Columbia Steel Co. at Elyria, Ohio, maker of cold-rolled strip. In 1926 the latter company erected a new continuous hot-strip mill at Butler, Pa. In 1927 Columbia was acquired by the American Rolling Mill Co. Some years ago Mr. Townsend and Mr. Naugel again joined forces in organizing the Rotary Electric Steel Co. at Detroit. Mr. Townsend was a graduate of the University of Toronto and of Ohio State University.

P E R S O N A L S



W. IRWIN, who has been made manager of the concrete bar bureau of the Carnegie Steel Co., effective June 1. Details of his career were given in The Iron Age of May 23.

LYMAN C. ATHY has been appointed superintendent of manufacturing operations for the new

pressed steel plumbing division of the Briggs Mfg. Co., Detroit.

♦ ♦ ♦

ROBERT T. CALDWELL, counsel for the American Rolling Mill Co., Middletown, Ohio, has been appointed adviser to the United States delegation to the International Labor Conference at Geneva, Switzerland, which opened on June 3.

♦ ♦ ♦

S. R. GOETZ, for 30 years identified with the New York Car Wheel Co., is vice-president of the newly formed Donner-Goetz, Inc., Buffalo, which will act as special sales representative in the iron and steel field.

OBITUARY

LAWRENCE L. MINOR, JR., a director and sales manager of Spang, Chalfant & Co., Inc., Pittsburgh, died on May 29 of injuries suffered in an automobile accident on May 25. Mr. Minor was born at Uniontown, Pa., on June 19, 1887. He had been associated with the Spang-Chalfant organization for about 25 years, having

Steel and Machine Shop Topics Planned for A.S.M.E. Meeting

MORE than 60 papers and addresses have been planned for the semi-annual meeting of the American Society of Mechanical Engineers, to be held at the Gibson Hotel, Cincinnati, June 18-21. The first group of technical sessions will be held on the morning of June 19.

Of the 27 or more technical meetings, one will be devoted to iron and steel and two to fuels. Five sessions have been arranged by the society's machine shop practice division, and three by the management division, two of which will be devoted to quality control. The materials handling division is sponsoring three sessions. The graphic arts division will have a comprehensive program, to include plant and research bureau visits. Prefabricated housing will be discussed by the society's wood industries division. Apprentice training, drying, and steam power are topics at other sessions.

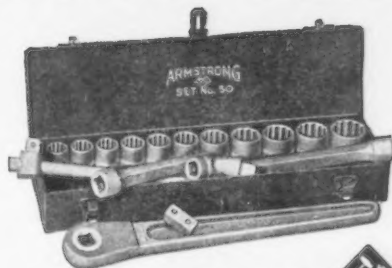
The Calvin W. Rice memorial lecture, June 20, will be on "Velox Steam Generator and Its Possibilities as Applied to Land and Sea," by Adolf Meyer, Brown, Boveri & Co., Baden, Switzerland. Ralph E. Flanders, president, Jones & Lamson Machine Co., and president of the A.S.M.E., will be the principal speaker at the dinner, June 20, which will also feature presentation of the Holley Medal for 1934 to Dr. Irving Langmuir, General Electric Co.

Papers at the iron and steel session, on the morning of June 21, include "Influence of Protective Layers on Life of Metals," by F. N. Speller, National Tube Co., and "Cohesion and Resistance to Plastic Deformation," by D. J. McAdam, Jr., and R. W. Clyne, Department of Commerce.

One of the machine shop sessions will be held jointly with the railroad division, June 20, and will include a paper on "How Can Railroad Shops Justify Use of Modern Machine Tools and Methods?" by A. Sellers, Jr., Wm. Sellers & Co., Inc. Another will be devoted to lubrication, and a third to power transmission. Machine shop sessions on

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the morning and afternoon of June 21 will feature the following papers and addresses: "Influence of Cutting Fluids on Tool Life in Turning Steel," by O. W. Boston, W. W. Gilbert and C. E. Kraus, University of Michigan; "Machine Tool Electrification," by P. McShane, Westinghouse Electric & Mfg. Co.; "Today's Machine Tool Problems," by Sol Einstein, Cincinnati Milling Machine Co.; "Economic Situation in the Machine Tool Industry," by H. H. Lind, National Machine Tool Builders Association; and "Why Standardization Pays," by John Gaillard, American Standards Association.

The quality control sessions, June 20, will include "Quality Control in Manufacturing," by J. F. Freely, Western Electric Co.; "Quality Control of Wright Aircraft Engines," by H. Emanuel; and "Quality Control of Hudson Motor Car Co.," by V. P. Rumely.

headed by F. R. Hoadley, Farrell-Birmingham Co., Inc., Ansonia, Conn., at once discontinued its own work and instructed the 32 supplemental code authorities to cease activities.

However, the regulations of the industry as contained in the gray iron code may be continued by a voluntary agreement. The code evidently has accomplished a great deal in stabilizing the gray iron industry, in eliminating ruinous cut-throat competition and in maintaining a uniformity in wage scales and there is a strong sentiment in the industry against abandoning the code regulations.

Continuance of the code regulations is expected to be the outstanding matter of discussion at the annual meeting of the Gray Iron Founders' Society in Cincinnati, June 6 and 7. That meeting will be held as scheduled but the recently announced program for the two-day session is being materially revised in order to consider plans for continuing the regulation of the gray iron industry by the industry itself.

Gray Iron Foundries Drop Code Control

CODE control of the gray iron industry entirely ceased after the decision of the Supreme Court declaring the NRA unconstitutional. The national code authority,

The Republic Steel Corp. has removed the Buffalo sales office from 475 Abbott Road to 1020 Liberty Bank Building, effective June 1. Thomas B. Davies continues in charge of the office as district sales manager.



Plant Expansion and Equipment Buying

NRA Decision Leads to Temporary Lull in Buying of Machine Tools

THE Supreme Court decision putting an end to the NRA led to some uncertainty in the machine tool trade last week, but the net result has unquestionably been an improvement in sentiment. Builders feel that many inquiries long held up because of business uncertainty may now result in orders and that countless new replacement programs may be inaugurated.

One of the General Motors divisions purchased about \$250,000 worth of tools and equipment last week, and the Chrysler Corp. is expected to place some tools in the next two weeks for Plymouth and Dodge. This company had not made any significant machinery purchases so far this year. Additional buying is expected to follow. In the Chicago district, a few tools are being bought by the railroads.

◀ NORTH ATLANTIC ▶

Southern Kraft Corp., 220 East Forty-second Street, New York, subsidiary of International Paper Co., same address, has let general contract to Doullut & Ewin, Inc., Queen and Crescent Building, New Orleans, for dock, 700 ft. long, and storage and distributing building, 120 x 300 ft., at Panama City, Fla. Cost about \$185,000 with conveying, loading and other mechanical-handling equipment.

Continental Can Co., 1 Pershing Square, New York, has plans for one-story addition to branch plant at Syracuse, N. Y. Cost over \$40,000 with equipment. Francisco & Jacobus, 511 Fifth Avenue, New York, are consulting engineers.

Signal Supply Officer, Army Base, Brooklyn, asks bids until June 17 for signal generators, ammeters, capacitors, output meters, resistance boxes and other equipment (Circular 136).

Pioneer Utilities Corp., Brooklyn, has been organized by Samuel Kobre, 1715 Caton Avenue, and associates, to manufacture oil burners and oil-burning equipment.

Public Works Officer, Navy Yard, Brooklyn, plans one-story addition to structural shop. Cost about \$630,000 with equipment. Extensions and improvements will also be made to electric lines and system to cost about \$420,000. Appropriations are being arranged.

Department of Sanitation, Municipal Building, New York, has filed plans for new three-story shop, equipment storage

and distributing building, 100 x 120 ft., at 169-75 Pleasant Avenue. Cost about \$835,000 with equipment. Plans have also been completed for one-story grit station and mechanical building on 133rd Street, Bronx. Cost close to \$800,000 with machinery. McKim, Mead & White, 101 Park Avenue, are architects for last noted structure. An initial fund of \$7,500,000 has just been secured through PWA for new sewage treatment plant on Wards Island, with power house, pumping station and other mechanical departments. Bids for initial work will be asked soon.

Quartermaster Supply Office, Army Base, Brooklyn, asks bids until June 20 for 1728 black galvanized steel coal hods (Circular 324).

Board of Education, Altona, N. Y., plans manual training department in new two-story high school, for which bids will be asked soon. Cost \$125,000. A. W. Inman, 71 Clinton Street, Plattsburg, N. Y., is architect.

National Distillers Products Corp., 120 Broadway, New York, has arranged for bond issue of \$15,000,000, a large part of fund to be used for expansion in plants and facilities. Former distillery of W. A. Gaines & Co., Frankford, Ky., recently acquired, will be modernized and additional equipment installed; addition will be built to distilling plant of Penn-Maryland Corp., at Carthage, Ohio. Sanderson & Porter, 52 William Street, New York, are engineers for last two noted projects.

O-Pan-Top Mfg. Co., Newark, N. J., Joseph Stern, president, care of Samuel I. Kessler, 9 Clinton Street, representative,

recently organized to manufacture patented sweepers and sweeping devices and equipment, has leased one-story building at 250 South Street, about 12,000 sq. ft. floor space for new plant, including parts production and assembling.

Merck & Co., Inc., Lawrence Street, Rahway, N. J., manufacturer of industrial chemical products, etc., has let general contract to Walter Kidde Constructors, Inc., 140 Cedar Street, New York, for three and four-story addition, 44 x 212 ft. Cost about \$200,000. It will be used for office and general operating service, and present such buildings will be converted for manufacturing, with installation of additional equipment. Ballinger Co., 105 South Twelfth Street, Philadelphia, is architect and engineer; George P. Butler, Jr., 40 East Forty-ninth Street, New York, is consulting architect.

Public Works Officer, Navy Yard, Philadelphia, plans following new buildings at local yard: one-story sheet metal shop, cost about \$438,000 with equipment; one-story paint and oil storage and distributing building, \$180,000 with equipment; one-story general equipment storage and distributing building for reserve basin, \$432,000 with equipment. Also at local naval aircraft factory, new one-story mechanical works for propeller testing and allied service, cost about \$110,000 with equipment; and arresting gear platform with complete equipment, \$360,000. Appropriations are being arranged and bids will be asked soon.

Pennsylvania Power & Light Co., Allentown, Pa., plans extensions in transmission and distributing lines in central Pennsylvania district, near Williamsport, Pa., for rural light and power service, including substations and other operating facilities. Cost over \$150,000.

◀ NEW ENGLAND ▶

Atlantic Wire Co., Branford, Conn., manufacturer of wire goods, has plans for three-story wire mill, 80 x 150 ft.; three-story storage and distributing building, 80 x 120 ft.; one-story metal-cleaning and shop unit, 35 x 150 ft., and one-story storage building, 60 x 140 ft. Installation will include ovens, annealing furnaces and accessories, cranes and general wire-working machinery. Cost over \$150,000 with equipment. Leo F. Caproni, 742 Elm Street, New Haven, Conn., is architect and engineer.

Public Works Officer, Navy Yard, Boston, plans one-story addition to steel storage and distributing building at local yard. Appropriation of \$48,000 is being arranged.

City Automotive & Appliance Co., Bridgeport, Conn., has been organized by Clyde Price and Arthur C. Vanderlist, 180 Buena Vista Road, Fairfield, Conn., to manufacture automobile equipment and other mechanical appliances.

Hathaway-Brale Co., New Bedford, Mass., plans new two-story machine shop



PERFORATED METALS

IN

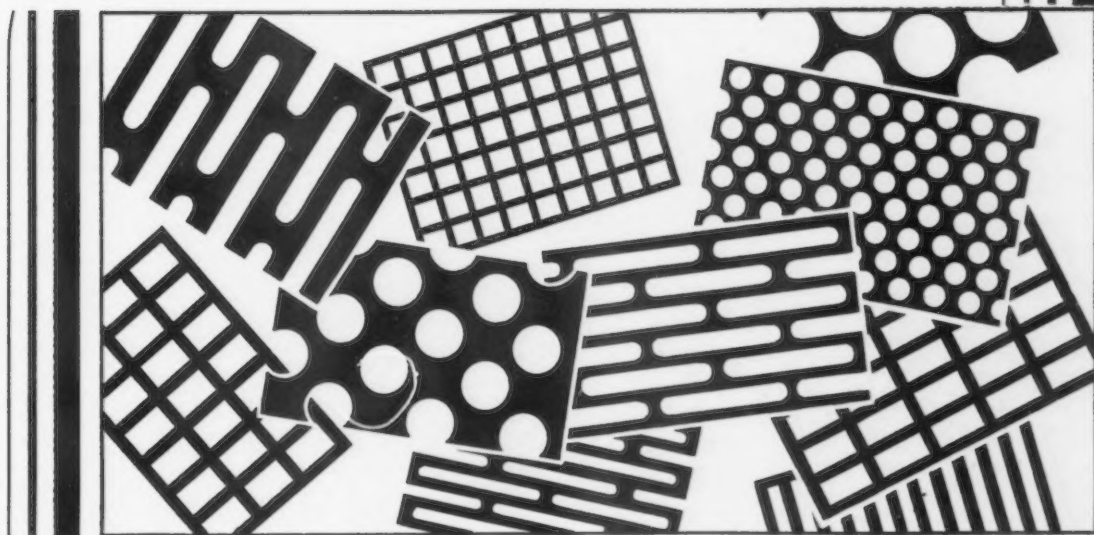
ALUMINUM, TIN, ZINC, BRASS,
COPPER, STEEL & OTHER METALS

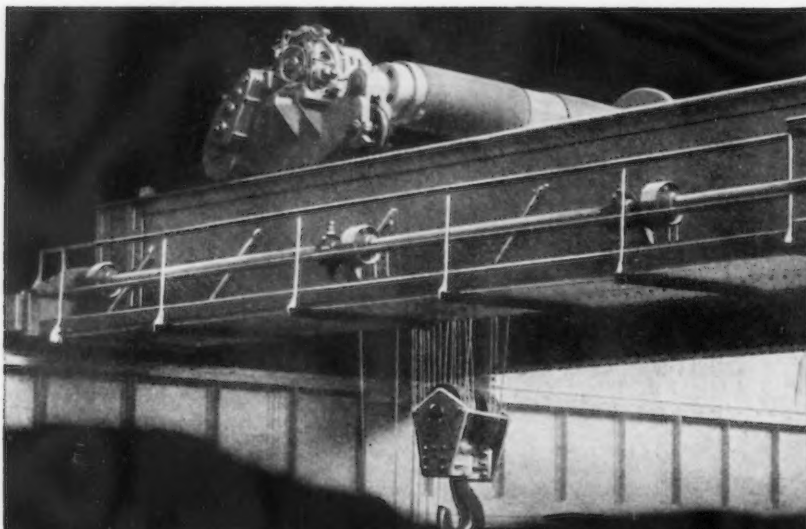
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CRANES

and mechanical works, 60 x 120 ft., at Fairhaven, Mass. Cost over \$25,000 with equipment. J. E. Tinkham will be in charge of construction.

Bureau of Yards and Docks, Navy Department, Washington, plans new one-story building at naval torpedo station, Newport, R. I. Cost about \$120,000 with equipment. Appropriation is being arranged.

Commonwealth Auto Body Co., Inc., Worcester, Mass., has been organized by Samuel Wilson, 100 Harrison Street, and associates, to manufacture automobile bodies.

◀ OHIO AND INDIANA ▶

National Supply Co., 3320 Bishop Street, Toledo, Ohio, manufacturer of oil and gas well equipment and supplies, has asked bids on general contract for one-story addition, 120 x 300 ft. Part of unit will be used as a machine shop. Cost over \$100,000 with equipment. Mills, Rhines, Bellman & Nordhoff, Inc., Ohio Bank Building, is architect and engineer. John Geisler is general manager at plant.

Kay Machinery Co., Inc., Cleveland, has been organized by W. F. Lyon and Thomas A. Burke, Jr., 17601 Kinsman Avenue, to manufacture machinery and parts.

American Products Co., 3265 Colerain Avenue, Cincinnati, manufacturer of industrial and other chemical products, has let general contract to Austin Co., Cleveland, for one-story addition, about 15,000 sq. ft. floor space, primarily for storage and distribution. Cost about \$30,000 with equipment.

Material Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until June

for landing gear wheel assemblies, landing gear brake assemblies, brake drum liners, screws, etc. (Circular 748).

Department of Public Service, East Palestine, Ohio, is having plans prepared by F. N. Straus, 2613 Queenston Road, Cleveland, consulting engineer, for extensions and improvements in municipal power plant, to include new 500-hp. water-tube boiler, mechanical stoker, pumps and other equipment. Cost over \$45,000.

Power Engineering & Machine Co., Inc., 5525 Bonna Avenue, Indianapolis, has been organized by Alfred Ridley and Paul G. Craver, 5453 Hibben Avenue, to manufacture power and other machinery and parts.

Contracting Officer, Quartermaster Corps, Jeffersonville, Ind., asks bids until June 14 for crow bars, pipe cutters, 2666 machinists' hammers, 2400 shingling hatchets, 2000 cross-cut saws, 500 carpenters' saws, 2666 carpenters' claw hammers, grinders, hammer handles, hatchet handles, levels and plumbs, grass scythes and other tools (Circular 10).

◀ WESTERN PA. DIST. ▶

Sun Oil Co., 1608 Walnut Street, Philadelphia, has plans for bulk oil storage and distributing plant on waterfront at Erie, Pa., with pumping plant and other mechanical departments, steel tanks, etc. Cost over \$200,000 with equipment.

H. J. Heinz Co., 1062 Progress Street, Pittsburgh, has approved plans for three-story addition to food products canning plant at Holland, Mich. Cost over \$45,000 with equipment. Company has also acquired 6-acre tract adjoining plant at Leamington, Ont., operated in name of

H. J. Heinz Co., Ltd., and plans additions. Cost more than \$100,000 with equipment.

American Oil Co., Grant Building, Pittsburgh, has asked bids on general contract for new bulk oil storage and distributing plant on 10-acre tract on Monongahela River, near Hays, Pa., recently acquired. Cost close to \$350,000 with equipment. Headquarters of company are in American Building, Baltimore.

◀ BUFFALO DISTRICT ▶

Jamestown Steel Partitions, Inc., Falconer, N. Y., recently organized to manufacture hollow metal partitions and kindred metal products, has acquired former plant of Wright Metals, Inc., and will make improvements and begin operations soon. Company is headed by Emil N. Johnson, 1321 Newland Avenue, Jamestown, N. Y., formerly general manager of Wright company.

Firestone Tire & Rubber Co., Akron, Ohio, has let general contract to Scrufari Construction Co., Niagara Falls, N. Y., for new factory branch, storage and distributing plant at Niagara Falls. Cost close to \$50,000 with equipment.

American Radiator Co., 1803 Elmwood Avenue, Buffalo, a unit of American Radiator & Standard Sanitary Corp., 40 West Fortieth Street, New York, has let general contract to Austin Co., Cleveland, for extensions and improvements in one-story steel foundry.

Board of Education, Olean, N. Y., plans manual training department in new two-story high school, for which general contract is being let to John W. Cowper Co., Buffalo. Cost close to \$900,000 with equipment.

◀ MIDDLE WEST ▶

Socony Vacuum Oil Co., 26 Broadway, New York, and 59 East Van Buren Street, Chicago, has plans for new bulk oil storage and distributing plant at Watseka, Ill. Cost over \$40,000 with steel tanks and other equipment.

Liquid Carbonic Co., 3100 South Kedzie Avenue, Chicago, manufacturer of carbonating and bottling machinery, parts, etc., will expend close to \$400,000 for expansion at local plant, instead of smaller sum previously noted. Company has plans for one-story addition, 100 x 600 ft., and will use part of this unit for production of bottle-washing machinery; present such branch plant at Cleveland will be removed to new structure where this line of output will be concentrated. Joseph J. Novy, 2434 South Ridgeway Street, Chicago, is architect.

State Highway Department, Cheyenne, Wyo., has let general contract to Thomas C. Cowley, Cheyenne, for one-story machine and equipment shop, 80 x 120 ft., and one-story office building adjoining, 35 x 42 ft. Cost about \$50,000 with equipment.

United States Engineer Office, Commerce Building, St. Paul, Minn., asks bids until June 14 for power, control and lighting systems at lock and dam No. 5-A, Mississippi River, near Winona, Minn., including transformers and regulators, air signal equipment, gas-operated electric power unit for standby service, gate-operating machines, valve-operating machinery, remote control switch cabinets and other equipment, including lock and dam power and lighting systems; also for one hand-operated traveling bridge crane.

Ford Metal Mfg. Co., 43 East Ohio Street, Chicago, recently organized as a subsidiary of American Asphalt Paint Co., same address, has taken over plant and business of Andrews, Field & McCormick, 2522 West Lawrence Avenue, manufacturer of bar metalware specialties, recently incorrectly noted in these columns as acquisition of Ford Products Corp. New owner will operate at plant at Kankakee, Ill., as previously stated, in conjunction with works of parent company at that place.

Common Council, Rock Rapids, Iowa, plans new municipal electric light and power plant. Cost about \$150,000 with equipment. Financing will be arranged through Federal aid. W. F. Gingrich is



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Carbon, Alloy, Corrosion
Resistant and Special
Steels Smooth Forged,
Hollow Bored, Rough or
Finish Machined, Heat
Treated to Specifications
... Forging Quality Ingots,
Pressed or Hammered
Billets.

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superintendent of public utilities, in charge.

Heil Co., 3000 West Montana Street, Milwaukee, manufacturer of steel dump bodies and hydraulic hoists for motor trucks, tanks and other equipment, is engaged in plant improvement program costing from \$75,000 to \$100,000. Under construction is a special shop for mounting motor truck equipment.

Fulton Co., 1912 South Eighty-second Street, West Allis, Milwaukee, manufacturer of automobile equipment and accessories, is adding about 2500 sq. ft. of new floor space. Samuel Fulton is president.

D. H. Palmer, 2081 South Fifty-sixth Street, Milwaukee, inventor of a mechani-

cal system for re-refining automobile crank case drainings, restoring it for lubrication purposes, has organized Milwaukee Refining Machines, Inc., to manufacture units on national basis. Norman R. Bemm is associated in enterprise.

Lauson Co. of New Holstein, Wis., Inc., is being organized by group of Milwaukee and local capital represented by Henry S. Wright, industrial engineer, 721 North Water Street, Milwaukee, which has acquired assets of John Lauson Mfg. Co., New Holstein, builder of gasoline tractors, farm engines, power farm equipment, etc. Plant will be rehabilitated and production enlarged under direction of C. O. Piper, vice-president and general works manager.

◀ SOUTH CENTRAL ▶

Standard Brake Shoe & Foundry Co., Exchange Building, Memphis, Tenn., with main plant and headquarters at Pine Bluff, Ark., has acquired former mill of Chicago Mill & Lumber Co., on 1½-acre tract near Memphis city limits, and will remodel for branch plant for manufacture of brake shoes, steel, cast iron and other metal castings. New units also will be built. Cost over \$150,000 with equipment. E. S. Dilley is president.

Brown Paper Mill Co., Inc., Monroe, La., has let general contract to W. C. Salley Co., Monroe, for one-story addition to mill at West Monroe, 35 x 180 ft., primarily for storage and distribution. Cost about \$30,000 with equipment.

Tennessee Valley Authority, Knoxville, Tenn., has plans for new lock at Pickwick Landing, Tenn., on Tennessee River, in conjunction with dam, now under way. It will be 110 ft. wide, 600 ft. long, with lift of 66 ft. Installation will include upper and lower lock gates, gate and valve operating machinery, bridge crane, power station, electric control and power systems, electric tow-haulage equipment and other machinery. Cost over \$1,500,000.

West Tennessee Power & Light Co., Jackson, Tenn., plans extensions and improvements in electrical distribution plant, including new equipment. Cost about \$35,000.

United States Industrial Alcohol Co., New Orleans, has let contract to Ingalls Iron Works Co., Birmingham, for one-story addition. Cost over \$50,000 with equipment. Company headquarters are in New York.

Hammond Box Co., Hammond, La., manufacturer of wirebound boxes, etc., has plans for one-story additions, 70 x 320 ft., and 32 x 160 ft., for storage and distribution. Cost over \$50,000 with equipment.

◀ SOUTHWEST ▶

Armour & Co., Union Stock Yards, Chicago, have plans for new four-story and basement packing plant, 48 x 208 ft., at South St. Joseph, Mo. Cost about \$100,000 with equipment.

American Cone & Pretzel Co., 2435 South Wharf Street, St. Louis, manufacturer of food products, has acquired adjoining property for one and three-story addition, 60 x 300 ft. Cost over \$65,000 with equipment.

Circle Cutting Die Co., St. Louis, has been organized by Elmer George, 6450 Hoffman Street, and associates, to manufacture dies and kindred mechanical specialties.

Board of Education, Library Building, Kansas City, Mo., George Tinker, secretary, has authorized one-story addition to manual training high school at Fifteenth Street and Forest Avenue. Cost over \$85,000 with equipment. Nate W. Downes, Finance Building, is mechanical engineer; Charles A. Smith, last noted address, is architect.

Commanding Officer, San Antonio Arsenal, San Antonio, Tex., asks bids until June 10 for one hydraulic jack, 20,000-lb. capacity, and one set automatic tools (Circular 15).

Magnolia Petroleum Co., Magnolia Building, Dallas, Tex., has approved plans for addition to oil refinery at Beaumont, Tex., and improvements in present units. Addi-

tional equipment will be installed. Portion of machinery will be furnished by M. W. Kellogg Co., Jersey City, N. J. Work will begin during summer. Cost close to \$1,000,000 with equipment.

Culver Aircraft, Inc., Dallas, Tex., has been organized by George L. Culver and Roy A. Nelson, 410 Stanhope Street, to manufacture airplanes and parts.

◀ SOUTH ATLANTIC ▶

Public Works Officer, Navy Yard, Charleston, S. C., plans new sheet metal-working shop, with electrical services, cost \$360,000 with equipment; one-story addition to structural shop, cost \$97,200 with equipment; one-story addition to pipe shop, cost \$63,000 with equipment; extensions and improvements in electric distribution lines and facilities, cost about \$120,000. Appropriations are being arranged.

Warren Co., 905 Fair Street, Atlanta, Ga., manufacturer of refrigerators, parts, etc., has let general contract to Austin Brothers, Inc., Atlanta, for rebuilding part of plant recently destroyed by fire. Cost close to \$100,000 with equipment.

Firestone Cotton Mills, Inc., Gastonia, N. C., recently organized subsidiary of Firestone Tire & Rubber Co., Akron, Ohio, plans expansion and improvements in lately acquired Loray mill of Manville-Jencks Corp., Gastonia, for cord fabric mill. Cost over \$250,000 with machinery. Robert & Co., Inc., Bona Allen Building, Atlanta, Ga., is consulting engineer.

Atlanta Ice & Bottling Co., 247 Courtland Street, N. E., Atlanta, Ga., plans expansion, to include new brewery division. Present buildings will be remodeled and new equipment installed. Cost about \$70,000 with machinery.

◀ MICHIGAN DISTRICT ▶

Fisher Body Corp., General Motors Building, Detroit, has let general contract to J. A. Utley, 6031 Mansur Street, for one-story addition to plant at Pontiac, Mich. Cost over \$300,000 with equipment. Company will also carry out other expansion and improvements at this plant.

Michigan Carton Co., Battle Creek, Mich., manufacturer of folding paper boxes and containers, has plans for new steam power plant, including 50-ft. steel stack. Cost over \$75,000 with equipment. Shreve, Anderson & Walker, Book Building, Detroit, are architects.

Midland Steel Products Co., 6660 Mount Elliott Avenue, Detroit, manufacturer of pressed steel specialties, will soon begin superstructure for one-story addition, 55 x 130 ft. Cost over \$65,000 with equipment.

Laetz Foundry Co., 800 Woodside Avenue, Bay City, Mich., has been organized by M. F. Cooley and associates, Bay City, to manufacture iron and other metal castings.

Hayes Industries, Inc., Jackson, Mich., recently formed with capital of \$100,000, has taken over plant and business of Automotive Fan & Bearing Co. for production of allied specialties, including automobile fans and parts, aircraft wheels and brakes, etc. Clarence B. Hayes, Jackson, formerly president of Hayes Wheel Co., is president and general manager.

◀ WASHINGTON DIST. ▶

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until June 18 for wire and cable, electrical equipment, fuses, pipe fittings, etc. (Circular 142); until June 20, 200 gasoline and oil steel drums and 30 flexible nozzle tubes (Circular 146).

Fairchild Aviation Corp., Hagerstown, Md., manufacturer of monoplanes and other aircraft and parts, will carry out plant expansion, including new shop and units with total of 29,000 sq. ft., increasing plant area to 70,000 sq. ft. Cost over \$75,000 with equipment.

Public Works Officer, Navy Yard, Norfolk, Va., plans additions to foundry, cost

7 Cooper-Bessemer executives cast 7 votes for Bell System Teletypewriter Service

PRODUCTION MANAGER:

"Invaluable. In planning production for the two plants, it does not make any difference at which end of the line we may happen to be. We are in instant communication with all departments."

GENERAL PURCHASING AGENT:

"With our two plants 170 miles apart, we have been able to centralize our Accounting, Purchasing and Research Departments, which would have been impossible otherwise."

ASST. SALES MANAGER, GROVE CITY DIVISION:

"A prospect calls at one office regarding a product built at another. While he sits at the desk, questions are teletyped and answered. No telling the prospect you will let him know tomorrow. You tell him now."

MANAGER OF COST ENGINEERING:

"Sold itself to me from the very first by transmitting my data accurately, and making a copy for me in the sending. I know that the other fellow gets just what I write."

ASST. SALES MANAGER, MT. VERNON DIVISION:

"Saves our time, gets the information we want promptly, correctly, and provides a permanent record of great value."

GENERAL MANAGER, GROVE CITY PLANT:

"Very useful in giving instructions between plants . . . ordering blueprints required on rush jobs . . . reporting goods received to Purchasing Department, enabling them to take the discount on bills."

ASSISTANT TREASURER:

"Great help and time-saver in securing information from the works in regard to their regular monthly statements."

The Cooper-Bessemer Corporation controls the operations of its plants at Mount Vernon, Ohio, and Grove City, Pa., as though they were under one roof, by Bell System Teletypewriter Service—typing by wire. Because it saves time, prevents errors, speeds shipments, it has proved its value in every branch of the business.

Your local Bell Company will be glad to show you how this fast, flexible service can be profitably applied to your business.



300 YARDS OR



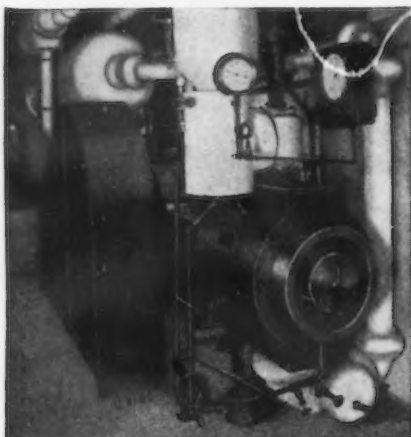
3000 MILES



For
steam pressure
and temperature
beyond existing
boiler capacity

use a

WORTHINGTON STEAM BOOSTER COMPRESSOR



NO costly boiler plant alterations are necessary. A Worthington Steam Booster will produce a higher steam pressure and temperature level... and save money.

- Built to meet individual requirements
- Steam, motor-belted, or direct-connected motor drive
- Worthington Feather Valves for highest efficiency
- Double tapered roller main bearings
- Automatic bearing lubrication
- Force-feed cylinder lubrication

**Worthington engineers
will be glad to study
your exact conditions**

**WORTHINGTON PUMP AND
MACHINERY CORPORATION**
General Offices: HARRISON, NEW JERSEY
Branch Offices throughout the World

WORTHINGTON



about \$180,000 with equipment; extensions and improvements in electric lines and system, cost about \$420,000 with equipment; also salt water system extension and improvements at cost of \$66,000. Appropriations are being arranged.

General Purchasing Officer, Panama Canal, Washington, asks bids until June 11 for one roll-forming machine; one combination machine for turning, burring and wiring sheet metal; one tapping machine; one motor-driven power hack-saw; steel machine bolts, steel carriage bolts, steel nuts, steel rivets, brass washers, cast iron washers, 10,000 lb. steel spikes, 10,000 lb. steel track spikes, 50,000 spring steel lock washers, one 5-ton tandem road-roller, cast iron pipe fittings, malleable iron pipe fittings, globe valves, angle valves, gate valves, brass washers, copper tacks and other supplies (Schedule 3061).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 14 for two generator sets, two switch-board panels and auxiliary equipment for Eastern or Western navy yards (Schedule 5223).

◀ PACIFIC COAST ▶

Public Works Officer, Mare Island Navy Yard, Vallejo, Cal., plans new utility transportation buildings; cost about \$216,000 with equipment. Extensions and improvements will be made in electric lines and facilities, including installation of new equipment; cost \$120,000. Appropriations are being arranged.

Bear Creek Winery, Ampere (San Joaquin County), Cal., C. G. Schuman, head, plans new plant at Diablo, Cal., including main one-story unit, 141 x 161 ft., one-story refrigeration and pasteurization building, 20 x 42 ft., and power house, 42 x 80 ft. Cost over \$75,000 with equipment.

Board of Education, Garland, Utah, has plans for new one-story mechanics shop at local high school, for instruction in machine and automotive work. Cost about \$30,000 with equipment. Joseph Nelson, Provo, Utah, is architect.

United States Engineer Office, Portland, asks bids until June 18 for one 4000-kw.

generating unit with accessory equipment for Bonneville hydroelectric power project (Circular 20).

Board of Education, Administration Building, Seventh and Clackamas Streets, Portland, asks bids until June 10 for manual training equipment and supplies for local schools. E. T. Stretcher is clerk.

City Superintendent, F. W. Scheffel, City Hall, Medford, Ore., asks bids until June 12 for pumping machinery and accessories, tanks, meters, pipe lines, etc., for new sewage disposal works. Cost over \$80,000 with equipment. Greeley & Hansen, 6 North Michigan Avenue, Chicago, are consulting engineers.

Exeter Citrus Association, Exeter, Cal., J. S. Dungan, president, has let general contract to T. B. Runciman, Exeter, for new one-story packing plant, 110 x 150 ft., to replace unit destroyed by fire a number of weeks ago. Cost about \$45,000 with mechanical-handling and other equipment.

Shafter High School District, Shafter, Cal., has plans for new one-story vocational training shop at high school. Cost about \$30,000 with equipment. Edwin J. Symmes, Habersfelde Building, Bakersfield, Cal., is architect.

◀ FOREIGN ▶

Imperial Typewriter Co., Ltd., Leicester, England, manufacturer of typewriters and parts, has approved plans for new block of buildings for office and administration service. When completed, present buildings given over to this purpose will be remodeled for plant expansion, increasing present production facilities about 50 per cent. Cost over \$250,000 with machinery.

South African Railways and Harbour Administration, Johannesburg, South Africa, will take bids soon for electrification of railway lines in Witwatersrand mining district. Appropriation of \$2,500,000 has been authorized for work. T. H. Watermeyer is general manager.

Lonzana A. G. fur Azetat-Produkte, Sackingen, Germany, recently organized to manufacture viscose rayon products, has acquired local property and will remodel for new plant. Cost over \$300,000 with equipment.

Activities Bearing on Machine Tools Distribution

o o o

A Department Conducted by L. M. Waite

o o o

Government-Backed Bank Aid for Machine Tool Purchases

INFORMATION is abroad that the limits have been substantially raised on amounts which can be secured, under certain conditions, through banks with Government backing for the purchase of machine tools and productive implements. Report is that the limit has now been set at \$50,000. The increase, which is from \$2,000, is said to be involved in the passage of very recent amendments to the National Housing Act.

* * *

The Smaller Shops

THERE are many shops among the more poorly equipped that would not only look all dressed up,

to their advantage, but would be far better positioned competitively and for earning capacity if equipped with some of the rebuilt machine tools which are offered from time to time. This condition, rather than implying modern merit in used tools, may be said to be due to equipment purchase neglect over a period of time sufficient in duration to assure that the operation of some used tools can result in comparative production gain. To this extent there is modernization-merit in used tools.

It could profitably be the concern of those operating this class of shop to busy themselves investigating the ready availability of good rebuilt equipment, modern equipment, and credit funds. Right now a clean shop-broom, ap-

Finished Disston Files individually proved for tooth bite. Inspected for soundness and straightness.

Automatic machine testing and recording cutting speed and length of life of Disston Files.



Inspecting Disston Taper Files—each and everyone individually, of the hundreds of thousands.



Annealed file blanks Brinell tested to insure uniform cutting of file teeth in the Disston way.

FLAT FILE.—Tooth designed and built the Disston way. Removes metal rapidly, operates freely with minimum effort, lasts long. The file with the strong heart and long life.

Checked up at every step

Disston Files are known for consistent quality and dependability.

Their excellence is *pre-determined* by Disston Laboratory research . . . and protected by constant laboratory and field tests!

Process inspections and tests by Disston-trained file experts are made at every step—followed by scientific automatic machine testing.

Thousands upon thousands of Disston Files are used in manufacturing Disston saws and tools . . .

And,—any and every advantage a file can give, in ruggedness of tooth, speed of cutting, minutes of life, is studied and valued by the management of the Disston plant, exactly as such advantages are valued by your own plant management.

And so, Disston Files must be good files!

WRITE for Disston Metal-Cutting Manuals: "Hack Saws", "Circular Saws", "Band Saws", "Carbide Products", "Files", etc. Free!

HENRY DISSTON & SONS, INC., 619 TACONY, PHILADELPHIA, U. S. A.

Branches: Bangor, Me., Boston, Chicago, Detroit, Memphis, New Orleans, Seattle, Portland, Ore., San Francisco, Vancouver, B. C.
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DISSTON

Chipping



AFTER liberal discard at the shears to eliminate pipes, blowholes and unsound steel, watchful inspectors carefully scrutinize every ASCO billet, all four sides, marking the slivers and surface defects.

Pneumatic hammers in skilled hands chip and rechip until every trace of surface imperfection is removed, and the billet is ready for final approval. This meticulous care is typical of the exacting standards under which ASCO Special High Grade Forging Billets are produced, a guarantee of the years of service and extra value which ASCO imparts to your finished forgings.



FORGING BILLETS

THE ANDREWS STEEL CO., NEWPORT, KENTUCKY

Carbon, Chrome, Chrome Molybdenum, Chrome Nickel, Chrome Vanadium, Molybdenum, Nickel, Nickel Molybdenum, Vanadium Billets and Slabs.

plied for the elimination of a lot of small shop antiques and for tools reorganization, would be very effective in providing proper habitation for the old gentleman who has been so anxiously waiting, just around the corner, since 1930. Many owners of the more poorly equipped shops throughout the country are possessed of a major opportunity at this time, to at least approxi-

mate a modernization of the equipment from which they expect to make a living for themselves and a few employees.

It is a consensus of opinion and statistical information that the so-called durable goods industry is capable of developing a huge amount of steady employment through its various activities. A good total of small orders is both necessary and

effective for accomplishment. There would seem to be little rhyme or reason for extensive small-shop refusal to use the available crowbar in junking some of the age-stricken, but still standing, machines which break the lines of durable goods equipment which must lead us out into the open, now that we have further tested theoretical remedies as against production and found them wanting.

Early dicta as to code procedure technocratically debarred the purchase of modern machine tools or even tools which might be able to do better than those in operation. Such rulings have not worked out, nor will many of the machines which they have kept in operation work out for profitably producing commodities and services which must inevitably come from small competitive shops. Owners who avail themselves of present opportunities to boost durable goods sales will not only help to expand employment but will assure for themselves a far greater chance to make a dollar during the days of time-cutting competition which lie directly ahead. Those who can qualify under the opportunity will secure both reasonable deliveries and most reasonable prices, on terms which it seems certain cannot prevail indefinitely.

* * *

Chicago area. Marshall & Huschart Machinery Co. have been appointed agents for the products of the V & O Press Co., Hudson, N. Y., in the Chicago and Milwaukee districts.

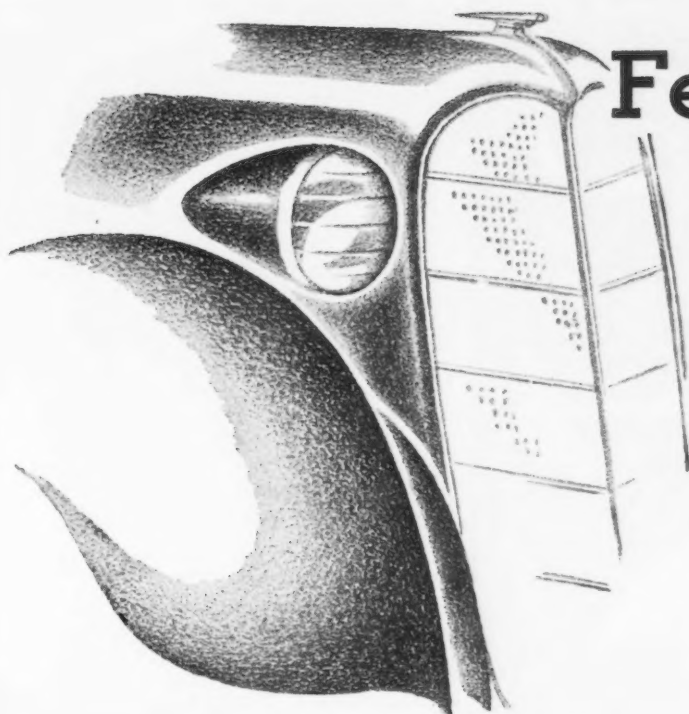
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Eastern areas. One dealer operating in the States of New York, New Jersey, Pennsylvania and Maryland, reports May as the most satisfactory month of the year. The total business was made up largely of single orders consisting of lathes, radials, milling machines, shapers, several orders for honing machines and one large boring mill. This company reports that in comparison with the first five months of 1934 the total business is something more than double, although 1934 was fairly good because of three rather large orders from mass production organizations. No pending business was held up because of the Supreme Court NRA decision. One dealer, representing the larger manufacturers in areas east of Cleveland, reports May as the equal of April in volume of business and as ahead of April in number of individual machines. April was this dealer's best month of the first five in 1935. The greater part of the May business was from individual shops. This dealer

FOR DIFFICULT DRAWS

USE Medium Carbon

Ferromanganese



Automobile fender steel must be clean and low in carbon to meet difficult draws.

Medium Carbon Ferromanganese is replacing standard ferromanganese in the production of low carbon steel. An addition of .36% manganese as standard ferromanganese introduces .03% carbon into the steel. A similar addition of Medium Carbon Ferromanganese increases the carbon content by only .004%. Consequently, Medium Carbon Ferromanganese permits a higher carbon in the bath than does standard ferromanganese. The higher carbon prior to tapping means less severe oxidation.

It decreases the amount of deoxidizers required and produces cleaner steel. The time of heat is shortened. Furnace and ladle refractory costs are reduced, and total conversion costs are lowered.

Electromet Metallurgists will gladly explain how to use Medium Carbon Ferromanganese for low carbon steels. Write for this information.

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation



CARBIDE and CARBON BUILDING
30 EAST 42nd STREET, NEW YORK, N. Y.

Electromet Ferro-Alloys & Metals

28-DD

THE IRON AGE, June 6, 1935—103



CHROMIUM

High-Carbon Ferrochrome (maximum 6% carbon)
Low-Carbon Ferrochrome (in grades, maximum 0.06% to maximum 2.00% carbon)
Chromium Metal
Chromium-Copper
Miscellaneous Chromium Alloys

SILICON

Ferrosilicon 15% Ferrosilicon 50%
Ferrosilicon 75%
Ferrosilicon 80 to 85%
Ferrosilicon 90 to 95%
Refined Silicon
(minimum 97% Silicon)
Calcium-Silicon
Calcium-Aluminum-Silicon
Calcium-Manganese-Silicon
Silicon-Copper
Miscellaneous Silicon Alloys

BRIQUETS

(Patented)
Chrome Briquets Silicon Briquets
Manganese Briquets

TUNGSTEN

MANGANESE

Standard Ferromanganese
78 to 82%
Low-Carbon Ferromanganese
Medium-Carbon Ferromanganese
Spiegeleisen
Manganese Metal
Manganese-Copper
Miscellaneous Manganese Alloys

SILICO-MANGANESE

All grades including Silico-Spiegel

VANADIUM

All Grades

ZIRCONIUM

35 to 40% Zirconium
12 to 15% Zirconium
Aluminum-Zirconium
Zirconium-Manganese-Silicon

Half-finished

WHEN YOU START WITH

SPECIAL COLD DRAWN SECTIONS

● YOU can order these convenient bar shapes *pre-formed to your purpose*, within specified tolerances, ready for cutting to length and surfacing smooth with minimum machining in your shop.

They are available in a wide range of sizes, shapes and physical properties to meet the requirements of your product. You will find that this rapid, economical method of making intricate parts offers new opportunities for profit in manufacture.

B & L Cold Drawn Special Sections give you the advantages of high accuracy, uniform quality and easy workability. Let B & L engineers make a survey of your needs, and submit recommendations for applying this short-cut method to your operations.

The job is half done when you begin with B & L Special Sections—try them on your next order.



Cold Drawn Bars and Shafting ● Ultra-Cut Steel ● Special Sections ● Alloy Steels

BLISS & LAUGHLIN, INC.

HARVEY, ILL. Sales Offices in all Principal Cities BUFFALO, N.Y.

reports one eastern buyer as having been ordered by his board of directors to withhold the placing of a \$15,000 order to await reactions to the Supreme Court decision on the NRA.

* * *

Middle West areas. All dealer reports for the month of May are

optimistic and none indicate any tendency on the part of prospective buyers to assume watch, wait, and listen attitudes in connection with the Supreme Court NRA decision.

* * *

Personal

Henry Eberhardt, Gould & Eberhardt, Irvington, N. J., returned

from a European trip on the S. S. Rex, May 29.

* * *

Russia

THE long-talked-of Russian order for screw machines—somewhere between 25 and 100 of them—has bobbed up serenely again. However, with our own domestic machine tool business stepping right along, this Russian revival finds competitive manufacturers far less excited over problematical final decision than during former stagings of the inquiry.

* * *

South America

THE Hopewell, Va., plant of the Tubize Chatillon Corp., will be dismantled during June and the equipment shipped to Brazil, where it will be set up for production using Brazilian cotton. It is reported that the establishment of the plant in Brazil will involve a considerable number of American engineers and something over 2000 employees when production operations are started.

* * *

Castings

THE zinc industry calls attention to the rapidly increasing use of zinc alloys in the bodies and housings of small tools and shop appliances. One producer doubts that the machine tool industry will avail itself of the possibilities inherent in the use of zinc alloys because of the close association between zinc and die-casting in competition with tool-cut products. However, this source of information is very certain of the ability of zinc alloys to serve the machine tool industry profitably in connection with gear boxes, housings, covers, etc.

* * *

Manufacturers

Bullard Machine Co., Bridgeport, Conn., has recently booked sufficient orders for two types of vertical, multiple spindle machines to keep the plant operating at capacity for three months. The company is employing 700 men on day and night shifts. Wages have been raised 30 per cent since Jan. 1.

* * *

Pratt & Whitney Co., Hartford, Conn., reports both domestic and foreign business as running ahead of 1934. Because the automobile show season is off to an early start this year company officials express the opinion that the machine tool industry may not experience the usual summer slump.

INLAND STRUCTURALS and PLATES

In Thousands of
PLACES

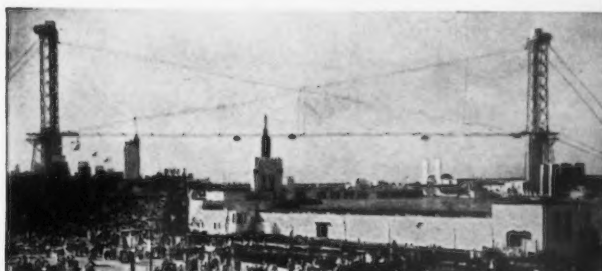
For Scores of
PURPOSES



SEATTLE Spillway gates of Inland Steel in dam—Lake Washington Ship Canal, Seattle, Washington.



Leading builders of many types of barges and boats are large users of Inland Structural Shapes and Plates. **BARGES**



CHICAGO The Skyride—wonder of Century of Progress Exposition, Chicago—built of Inland Steel.



First battle-deck floors and roofs in private residence were Inland Steel. **HOMES**



GRAND CANYON Inland Steel used in 834 foot bridge across Grand Canyon.



Gantry crane in plant, Niagara Falls, New York —Inland Steel is used for a wide variety of equipment and machinery. **CRANES**



IOWA The Modern Field House—University of Iowa, Iowa City, Iowa—of Inland Steel.



Mississippi River bridge, Savanna, Ill. Hundreds of structures are of Inland Steel throughout the country, particularly the Central West. **BRIDGES**

INLAND STEEL

Sheets Strip Tin Plate
Plates Structurals Piling

Rails Track Accessories
Bars Rivets Billets

38 South Dearborn Street, Chicago, Illinois

LOW-COST HANDLING WITH LINK-BELT CONVEYORS

FREE-turning, accurately made idlers assure the belt conveyor a good roadbed for economical operation . . . minimum friction loads . . . long belt life . . . and the lowest maintenance cost. Link-Belt makes a full line of anti-friction, pressure-lubricated idlers, as well as all necessary machinery and driving parts for the complete conveyor.

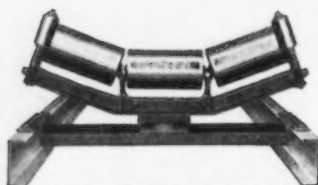
Submit your conveyor and power transmission problems to Link-Belt. Send today for catalog.

LINK-BELT COMPANY

CHICAGO - PHILADELPHIA - INDIANAPOLIS
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Offices in Principal Cities



Link-Belt Anti-Friction Type 70 Belt Conveyor Idler.



Link-Belt "Positive" Self-Aligning Idler, for maintaining conveying belt in a central position, thereby materially lengthening its life.



Link-Belt Anti-Friction Type 40 Belt Conveyor Idler.

5158-D

Organized Labor Still Pressing for Passage of Wagner and Guffey Bills

(CONTINUED FROM PAGE 68)

such a long, disturbing Congressional session, nor is it believed it would be required, large as the program is. Yet the President's

stand undoubtedly means Congress is in Washington to stay for a long time unless there is another change of plans.

Meanwhile, organized labor is seeking to check on reaction from the NRA decision as it affects wages and hours. Though NRA and all its units are now "dead as a dodo," organized labor nevertheless has succeeded in making use of the NRA Labor Advisory Board, of which President Green of the A. F. of L. is head, in checking on employers of the country. To this end the board last week sent out telegrams to 200 State labor federations and local councils asking for daily reports on lengthening of hours and wage cutting, employment of child labor, and discharge of employees for union activities.

Unemployment Law May Be Changed

AT the instance of and with full approval of the Industrial Commission of Wisconsin, a bill was introduced in the Wisconsin Legislature on May 29 postponing from July 1, 1935, to Jan. 1, 1936, commencement of payments of benefits under the Wisconsin unemployment compensation act. The commission is administrator of the act and indicated that the postponement is deemed wise in awaiting action by Congress on Federal social security legislation embodying a National job insurance law with which the Wisconsin act will have to dovetail. The Wisconsin act permits employers to set up individual funds by contributions, while the proposed Federal act as passed by the House of Representatives on April 19 establishes a pool. The Senate has accepted an amendment by Senator Robert M. LaFollette, Jr., of Wisconsin, permitting Wisconsin employers to continue operating on the separate reserve basis.

New Trade Publications

Wire Rope Tramways. American Steel & Wire Co., Chicago.—Handsomely bound and illustrated booklet of 108 pages, providing full details of installation and use of wire rope tramways. Among the specific products covered are aerial tramways for freight transportation, tramways for individual structures, mechanical equipment, track cables, traction ropes, aerial tramways for passenger transportation, and cableways.

Aluminum Alloys.—Aluminum Co. of America, Pittsburgh.—Leaflet devoted to company's T-slot pistons, cam grinding. Lo-ex alloys and Alumilite finish.



● Only strip that is flawless in finish could produce these dishes. Offered in national advertising, and proved immensely popular. Made from cold rolled Acme Superstrip, as are scores of products in the general, automotive, and electrical fields.

● Cold rolled cut lengths of Acme Superstrip, being packed on skids for shipment. Careful packing insures safe delivery and protection to the high finish.

BEAUTY OF FINISH IN ACME SUPERSTRIP CAN HELP SELL CONSUMER PRODUCTS

● Manufacturers using metal parts that must pass the test for beauty, as well as utility, can benefit by using Acme Superstrip.

It's not run-of-the-mine strip steel. Acme makes Superstrip to meet the specific needs of each product.

Extreme care and skill produce finishes that are unusual in their perfection. It is not only the rolls or their finish, but their *operation* that gives the finish that wins approval by manufacturers of nationally known consumer products.

Even to the method of packing for shipment,



the Acme care extends. Superstrip reaches you in a manner best suited to your production needs.

Send today for the booklet "Batting 'Em Out" — telling of better products from Superstrip. ACME STEEL COMPANY, General Offices: Chicago. Branches and Sales Offices in Principal Cities.



Acme Superstrip

HOT ROLLED • COLD ROLLED



GALVANIZED • STAINLESS

ACME STEEL COMPANY, 2825 Archer Avenue, Chicago
Send, without obligation, the booklet "Batting 'Em Out."

Name

Firm

Street

City State

PIG IRON

five established brands

Federal Iroquois Perry

Toledo Zenith

COKE

Foundry, Industrial and Domestic

Chicago Solvay

Milwaukee Solvay

Perry Toledo

Waukegan

Zenith

All Lake Superior grades of

IRON ORE

By-product and Steam

COAL

Pickands, Mather & Co.

Cleveland - Chicago - Detroit - Erie - Toledo

Minneapolis - Duluth

opposite, although very important, use in sub-zero service. Here the added nickel definitely increases and makes for uniform impact values even at temperatures as low as 100 deg. F. Consistently, Charpy impacts of 15 ft. lb. at 75 deg. F. can be obtained (see Table II). Consequently this alloy offers to the dewaxing process of the refining industry a metal whose resistance to shock at low working temperatures is far better than any plain carbon steel, as shown by results consistently obtained to date.

The United States Navy for its high tensile steel, i. e., 80,000 lbs. per sq. in. minimum tensile strength, found it advisable to list in its hull steel specification a manganese-vanadium grade of the following typical analysis: carbon under 0.18 per cent, manganese maximum 1.45 per cent and vanadium 0.08 per cent to 0.18 per cent. Numerous tests carried out at Washington proved to the Bureau of Construction and Repairs that this analysis exhibited less tendency to air harden in the welded zone than some other steels so tested. Ship welding varies definitely from pressure vessel welding in that stress relieving or heat treatment after welding is impossible. Consider now this analysis and its possibilities—a particularly high ratio between yield point and tensile strength (see Table III). If advantage for code designing could take into its formulae the yield point as a basis of determining allowable working stress, this steel would present a big advantage in weight saving.

Carbon-Molybdenum Plates Used

Due attention is just beginning to center around carbon-molybdenum plate steel. By this is meant carbon under 0.25 per cent and molybdenum between 0.40 and 0.60 per cent. Tubes of this grade have been successfully used, and the plate industry is now arousing to the advantage of using molybdenum, i. e., definitely improved physical properties at elevated temperatures. One has only to scan the creep values of carbon-molybdenum steel and compare them with values on steels of equivalent room temperature strength, and readily the imparted improvements can be noted. Advantage has been taken of this element in Europe for years. In plate and vessel material, room temperature strength

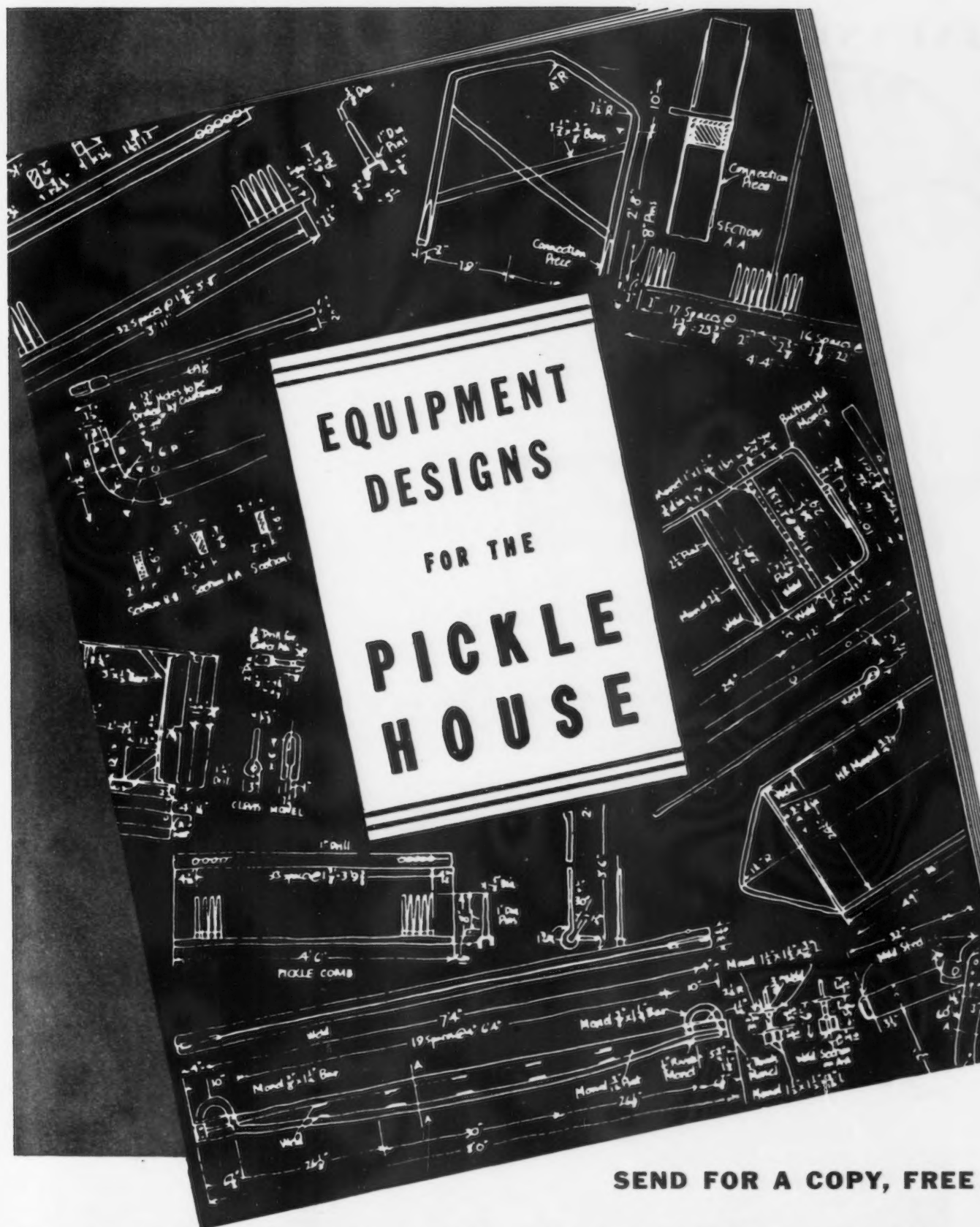
Modern Materials for High Pressure Boiler and Pressure Vessels

(CONTINUED FROM PAGE 26)

motive service, the excellent ductility (See Table I) of this type has proved its merit. Even inside firebox sheets with an ultimate of 65,000 lb. per sq. in. have been

installed, and longer life of side sheets with minimized crowfeet checking around staybolts has been noted.

This same analysis has found an



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This book is full of practical, 'how-to' information. Illustrated by detail drawings, charts, and photographs that show how the other fellow licks some of his pickling-room difficulties with Monel Metal. Write for a copy now. Address: Dept. K,



Monel Metal is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.



THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N.Y.

BALANCED SPIRAL BELT



U. S. Patent
No. 1,952,873

Runs True

because the spirals are balanced, woven alternately right and left, articulating on the crimped reinforcing connector . . . a feature exclusive with the balanced spiral belt. This special feature eliminates all tendency toward side travel. Of equal importance are its flatness, its ability to hold width and not elongate, and its complete flexibility. Consult the Wissco engineer . . . send for the questionnaire and the new conveyor handbook.



WICKWIRE SPENCER STEEL COMPANY
New York City Worcester Buffalo Chicago San Francisco

WISSCO
CONVEYOR BELTS

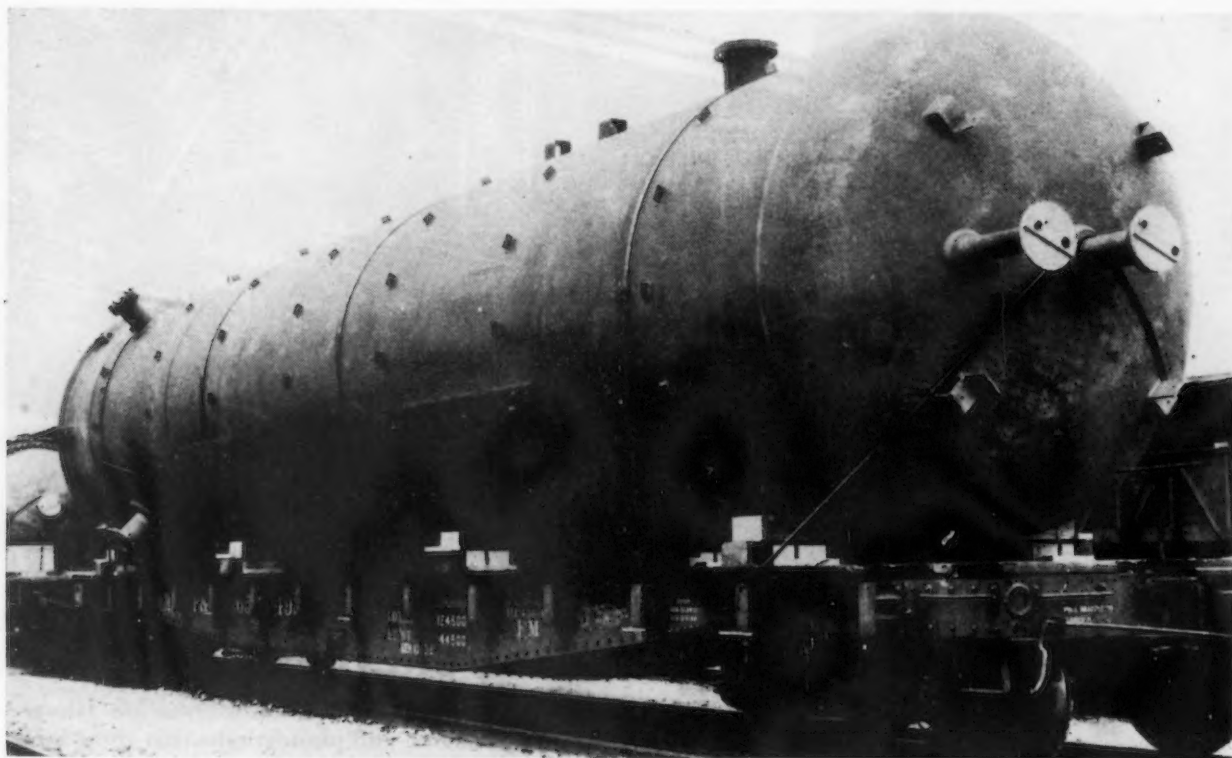


of 75,000 lb. per sq. in. can be easily obtained. Units of this grade are in service in an eastern refinery, and the latest information indicates complete realization of anticipated results.

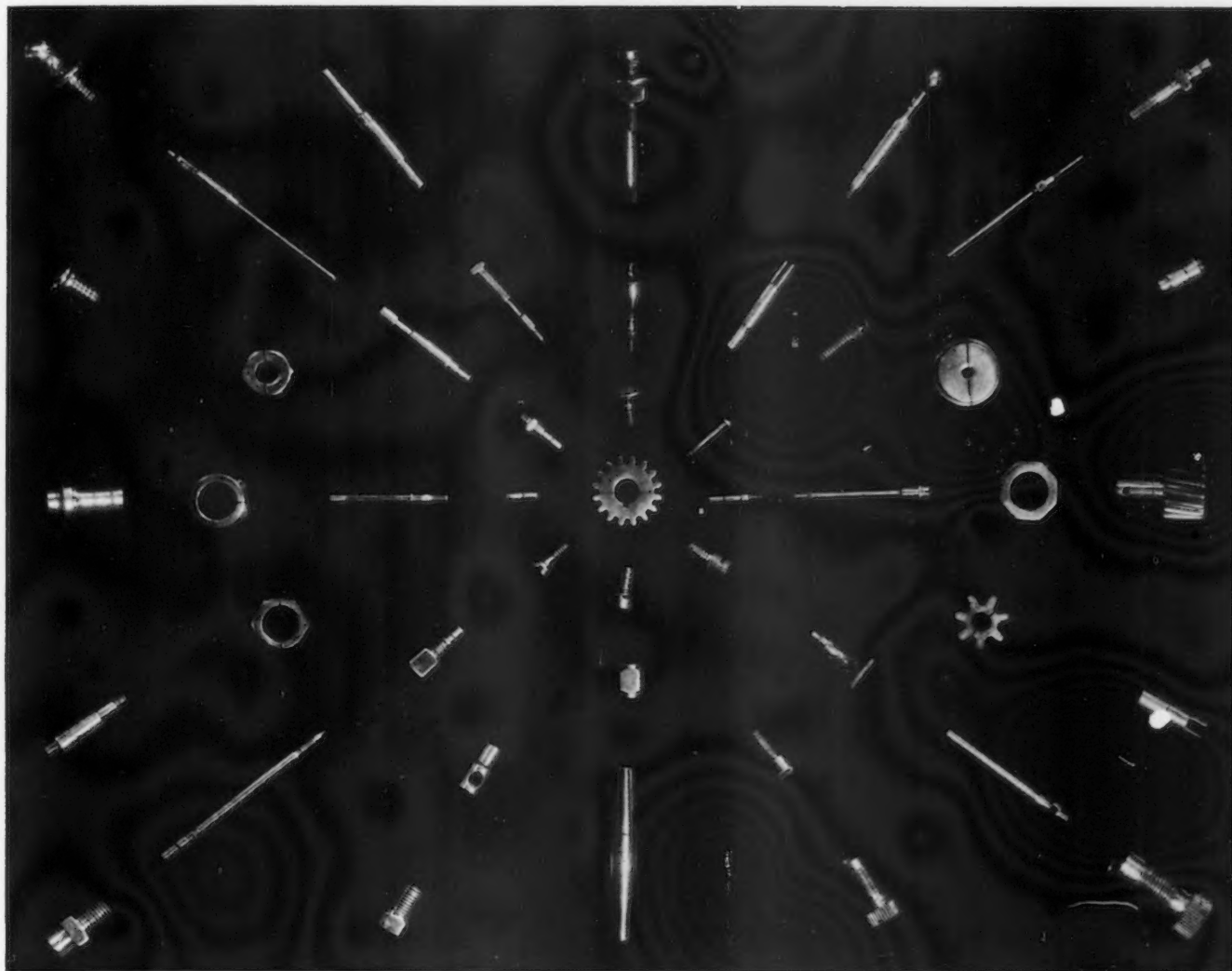
Mention was made previously that the American Society of Mechanical Engineers' boiler code has not adopted any alloy grade for welded construction. But one alloy specification, namely S-28, has

been approved for riveted construction. Such rapid and satisfactory progress has been made with this "C.M.S." steel that early recognition for welded vessels is looked for. This "C.M.S." specification represents an alloy designated in the trade as Cromansil. Such steel is made and listed in two grades, i.e., minimum 75,000 lb. per sq. in. and minimum 85,000 lb. per sq. in. tensile strength. The carbon content in the first grade is limited to 0.17 per cent maximum, while the 85,000 lb. per sq. in. minimum class permits a 0.25 per cent maximum carbon. The name of alloy—Cromansil—reveals its chief components, i.e., chromium, manganese and silicon. Each of these elements is found in the following ranges: Chromium 0.30 to 0.60 per cent, manganese 1.05 to 1.40 per cent, and silicon 0.60 to 0.90 per cent. The metallurgical balance of these three toughening elements has made possible a very versatile and workable low alloy steel of good high strength properties without the decided loss of that very necessary factor called ductility (see Table IV).

The merits of any material are best substantiated by its use, and actual tests are worth many expert opinions. Many tons of this steel



PRESSURE vessel used in the oil industry in sub-zero service, built by A. O. Smith Corp., Milwaukee, Wis., from plates and flanged heads of Lukens nickel alloy steel.



Smoothies!

Revere Free-Cutting Brass Rod and Revere Free-Cutting Herculoy Rod (a patented high-strength silicon-bronze alloy) have four all-important advantages for the production of high-speed screw machine products.

1. They have a smooth, clean surface which may be polished or plated at minimum expense.
2. The uniform dense structure of these rods permits the highest machining speeds, resulting in increased production.
3. Revere metals have a high scrap value. Steel borings or screw machine scrap is practically worthless, but the salvage value of brass

borings is quite high. Since screw machine parts frequently result in as much as 60% scrap, this advantage is a very important one.

4. These advantages often bring the cost of screw machine parts made from Revere metals below the cost of similar parts made from steel.

It will pay you to investigate the application of Revere metals to your business. Our Technical Advisory Service will gladly cooperate with your designers and engineers at any time. Why not follow through on this service? Address our Executive Offices for complete information.

Revere Copper *and* Brass INCORPORATED

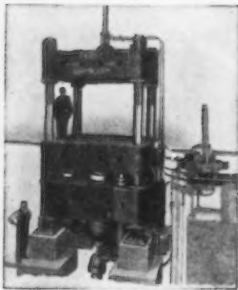
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FARREL-BIRMINGHAM HYDRAULIC PRESSES

for Metal Forming



Left — 1500-ton Hydraulic Flanging Press, 97" x 85" clear between tie rods, 72" maximum opening, 48" stroke, complete with control and operating valves.



Right — 200-ton Electric-Oil Hydraulic Press, 49½" x 80" platens, 24" dia. ram, 24" stroke, electrically operated and controlled, self-contained.

These are only two examples of a variety of Farrel-Birmingham Hydraulic Presses for the fabrication of parts from steel sheet and plate. ☐ We are prepared to design and build presses for specific purposes . . . any size . . . any capacity . . . any pressure. ☐ Your press problems will have the benefit of sound engineering and practical experience.

FARREL-BIRMINGHAM COMPANY, INC.

100 Main Street, Ansonia, Conn.

have been most successfully welded into Diesel engine frames and housings of various intricate shapes and thicknesses, with power units developing around 600 hp. at 1200 r.p.m. The successful manner in which this steel resists the accompanying vibratory stresses proves that this alloy has weldability and toughness. Taking advantage alone of the high strength of the 85,000 lb. per sq. in. minimum grade, reductions in weight are so evident that its attractiveness cannot be denied.

Nickel and chrome-clad material has been produced whose corrosive resistant properties present to users very definite economic savings. The strength of plain steel base material can be used for computing working stress and the thin layer of cladding, securely bonded, can be depended upon to resist the corrosion for which it is recommended. Nickel-clad plates having 10 to 20 per cent nickel, have been successfully produced and fabricated and fusion welded to Class 1 requirements of the American Society of Mechanical Engineers' boiler code. Vessels so constructed meet, particularly in the chemical industries, a long sought for need. The manufacturing methods of this nickel-clad material have been so developed that uniform thickness of the cladding is assured, and the bond between the layer of nickel

and the base steel is a metallurgical one. The good physical properties of the base metal are not impaired by this bonded layer of nickel since this element alone is strong and ductile. Satisfactory welded joints can be made by using ordinary steel rods on the base metal side, and pure nickel rods on the clad side, thereby making a continuous lining of pure nickel.

Other combinations of alloys worthy of consideration are being offered and developed for various purposes. The appreciation of improved quality is foremost today, and one of the very necessary aids for this development is the addition of wisely selected alloys. However, due regard must be given first of all to well and carefully made steel, for just the addition of certain metals will not overcome poor melting practice. Extra care and close observation with technical control are most essential today in order to offer for fabrication and construction better and higher quality steel. The selection of base material of the proper quality must be given thought and the industry today more seriously than ever before is, so to speak, USE-minded. Consequently the opinions of fabricators and inspection groups are welcomed to guide the development of plain carbon or alloy steel, since the day of special steels for all individual purposes is here to stay.

Los Angeles to Place 6000 Tons of Steel

SAN FRANCISCO, June 3.—Construction in the near future of the 237-mile transmission line from Boulder Dam to Los Angeles is seen in the announcement by the Metropolitan Water District that specifications have been completed and a call for bids will be issued shortly. Approximately 6000 tons of structural steel will be required.

Although bids have been opened in the Northwest on several projects involving major tonnages, no general contracts have yet been awarded. At Fort Peck Dam, bids are under advisement for a retaining wall in which 9400 tons of sheet piling are specified. A construction trestle and cement silos at Grand Coulee Dam, near Almira, Wash., will require 2600 and 700 tons of shapes respectively. At Portland, Ore., the official date has not yet been set for opening bids for the main gates at Bonneville Dam. Approximately 5000 tons of structural steel is involved.

Bookings during the past week were limited. Outstanding was an award at Oakland, Cal., by the East Bay Municipal Utility District of 3000 tons of cast iron pipe. United States Pipe & Foundry Co. was the successful bidder. Pacific Coast Steel Corp. took 350 tons of joists for the San Francisco-Oakland bridge distribution structure and 317 tons of reinforcing bars for the Hall of Records building at Fresno, Cal.

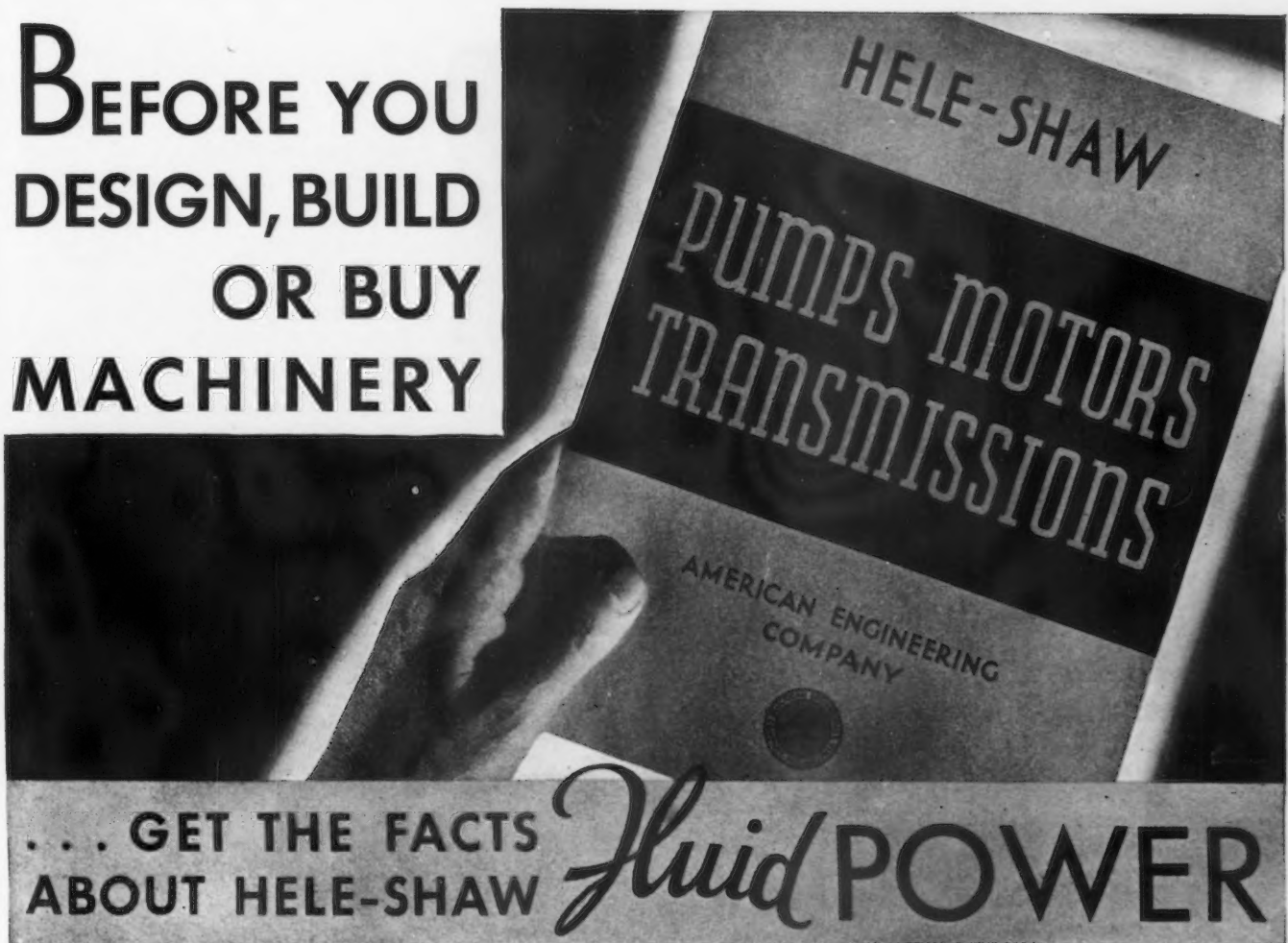
Although business in general on the Pacific Coast looked with favor on the recent NRA decision, the steel trade has appreciated the price stabilization benefits. No change in prices has been announced and an immediate revision is not anticipated.

Trade Notes

Harnischfeger Corp., Milwaukee, which several years ago acquired plant and business of Milwaukee Crane & Hoist Co., West Allis, builder of electric monorail type hoists, is moving hoist shop from original location to main works at 4401 West National Avenue to consolidate production.

American Electric Furnace Co., Boston, has appointed the following direct factory representatives for the sales and service of all its products: Anderson-Bolds, Inc., 1836 Euclid Avenue, Cleveland, for Ohio and western Pennsylvania; W. G. Nichol Co., 711 West Michigan Street, Milwaukee, for Wisconsin, less the western section; Northern Machinery and Supply Co., Lumber Exchange Building, Minneapolis, for Minnesota and western Wisconsin.

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DESIGN, BUILD
OR BUY
MACHINERY**



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- Can I drive 3 machines from one pump? See Page 7
- What types of Machines will it drive? . See Page 8
- Who uses Fluid Power? See Page 9
- Can I get remote control? See Page 10
- How does the Hele-Shaw pump work? . See Page 14
- How can I obtain any speed from 0 to maximum in a transmission? . . . See Page 18
- What is the maximum torque of a 10 H. P. transmission? See Page 21
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YOUR fitting requirements are exacting as to accuracy, workmanship and design... line up with the leaders—specify *Weatherhead*

FOR
BRASS FITTINGS AND
SCREW MACHINE PRODUCTS

THE WEATHERHEAD CO., 620, 714 Frankfort Ave., Cleveland, Ohio

Large Double-End Pipe Threader Arranged for Rapid Production

(CONTINUED FROM PAGE 59)

leaving the pipe held by the chucks.

Gripping power of 78,000 lb. is available, but this may be modified by a tapped resistance in the line-circuit of the chuck-operating motors which, through rheostats, provide 24 stages of resistance and similar stages of gripping power.

With the pipe in position for threading, the machine is set in operation. Rotation of the two cutters begins, and the pipe starts to revolve. The cutter heads feed toward the pipe automatically, approaching the pipe ends at a rapid rate, then slow up and feed into the pipe for the full depth of the thread, traversing along the axis of the pipe a distance equal to the pitch of the thread in one full turn of the pipe. After slightly more than a full turn of the pipe the cutters are rapidly withdrawn and return to the starting position and the machine stops.

The chucks are then opened, the jacks are raised and the heads are moved back from the ends of the pipe to an adjustable automatic stop. The jacks are then lowered, delivering the pipe back on to the transverse rails above the bed.

From these rails the pipe is rolled off the machine on to another pair of jacks, which lower it in line with two other rails parallel to and located slightly lower than the transverse rails on the machine

bed. After inspection the pipe is rolled to a conveyor.

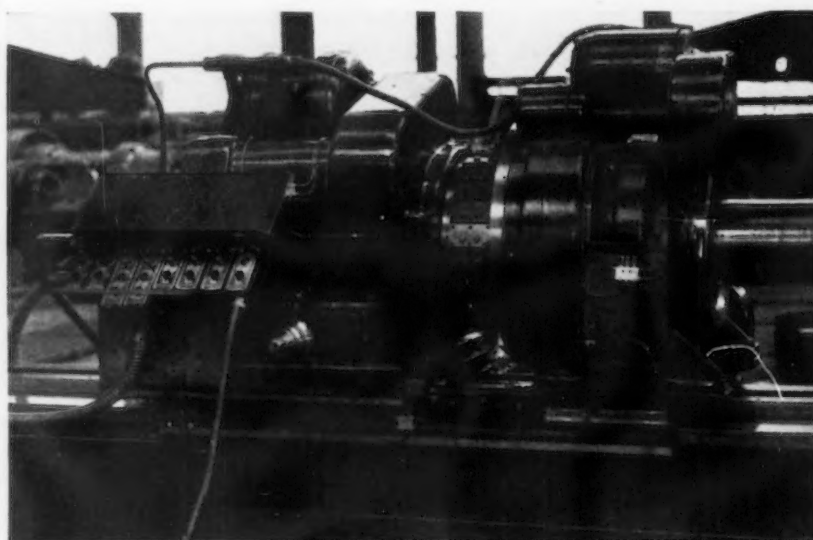
The cutters are of hollow mill type and carry 24 blades. Each cutter is individually driven by a 15-hp. motor, having the same push-button controls. The two work spindles are connected by a long shaft at the rear of the machine, driven by a 30-hp. motor. This motor and the two motors that drive the cutters are interlocked so that the pipe cannot be rotated or the automatic cycle of the machine started, until the cutter operating motors are started. If the latter motors stop, the work-driving motor is cut out.

Dual push-button control at each end is provided for all operations, the dual set of buttons permitting full control from either end through a series of in-line push buttons, conveniently located.

Coolant is supplied into the rear of the hollow cutter spindle and is carried by leads through the center of the spindle. From this point it is delivered, through radially drilled holes, into the cutter body. It then passes through 24 drilled holes from which jets of the coolant are played on each of the 24 cutter blades.




During tests of the machine for accuracy, the lead of the pipe in 2 in. was held to a tolerance of plus or minus 0.001 in. and the tooth or thread depth to 0.0005 in. Tooth profile and included taper per foot were very accurate. These tolerances were maintained in threading high carbon, high manganese pipe.

The illustrations show the machine threading a 11 $\frac{3}{4}$ -in. diameter pipe 40 ft. 6 in. long.



Front view of left-hand head showing the dual in-line control with which each head is provided.

STEEL IN THE SERVICE OF THE BUILDING INDUSTRY



A review of the following pages will reveal to the architect and engineer the wide range of products and of technical service offered by the following Subsidiary Manufacturing Companies of the United States Steel Corporation.

* **AMERICAN BRIDGE COMPANY**
PITTSBURGH • PENNSYLVANIA

* **AMERICAN SHEET AND TIN PLATE COMPANY**
PITTSBURGH • PENNSYLVANIA

* **AMERICAN STEEL & WIRE COMPANY**
CHICAGO • ILLINOIS

* **CARNEGIE STEEL COMPANY**
PITTSBURGH • PENNSYLVANIA

* **ILLINOIS STEEL COMPANY**
CHICAGO • ILLINOIS

* **NATIONAL TUBE COMPANY**
PITTSBURGH • PENNSYLVANIA

Export Distributors:

UNITED STATES STEEL PRODUCTS COMPANY • NEW YORK

Pacific Coast:

COLUMBIA STEEL COMPANY • SAN FRANCISCO

South and Southwest:

TENNESSEE COAL, IRON & RAILROAD COMPANY • BIRMINGHAM

United States Steel  Corporation Subsidiaries



Steel Sheet Piling has an important use in foundation work. Driven in advance of excavation, it affords maximum working area and prevents undermining of adjacent ground, walls, or streets. Carnegie Piling comprises a full range of efficient sections of both straight and arch-web types. Where the arch-web sections are used, the design is such that all the arches can be faced in the same direction, which provides a shallow but strong wall. Carnegie Piling is sold either new or used.

CARNEGIE STEEL COMPANY • PITTSBURGH

The Advent of Structural Steel, fifty years ago, was immediately recognized as the greatest single contribution to building progress. The first structural sections were rolled by a Carnegie Mill in 1884 and were used in the top four stories of the Home Insurance Building in Chicago. In 1927, wide-flange Carnegie Beam Sections (now widely known as CB's) were introduced, representing the most recent development in structural steel and providing the highest factors of strength per pound of metal. Carnegie Light - Weight Beams, Stanchions and Joists, first produced in 1934, are a further extension of the CB series. To light-occupancy structures, such as schools, hospitals and apartment houses, they bring the full benefits of steel construction at competitive costs.

Special sections for bearing-pile use are still another outgrowth of CB design. Sturdy, wide-flange CB sections were found so useful for this purpose that the requirements have been thoroughly studied and a suitable line of CBP sections has been made available.

Steel Sheet Piling is another product first rolled in America by Carnegie Steel Company. A group of well designed sections is offered, adaptable to all types of construction.

Other Carnegie products of interest to the building field include column base plates, reinforcing bars, I-Beam-Lok and T-Tri-Lok for heavy duty floors and sidewalks, safety floor plate, and a full range of standard structural steel sections. A competent engineering staff is employed and consultation is welcomed.

**US
STEEL**

**ROLLED STRUCTURAL SECTIONS FOR
EVERY CONSTRUCTION NEED . . .
FROM FOUNDATION TO PENTHOUSE**



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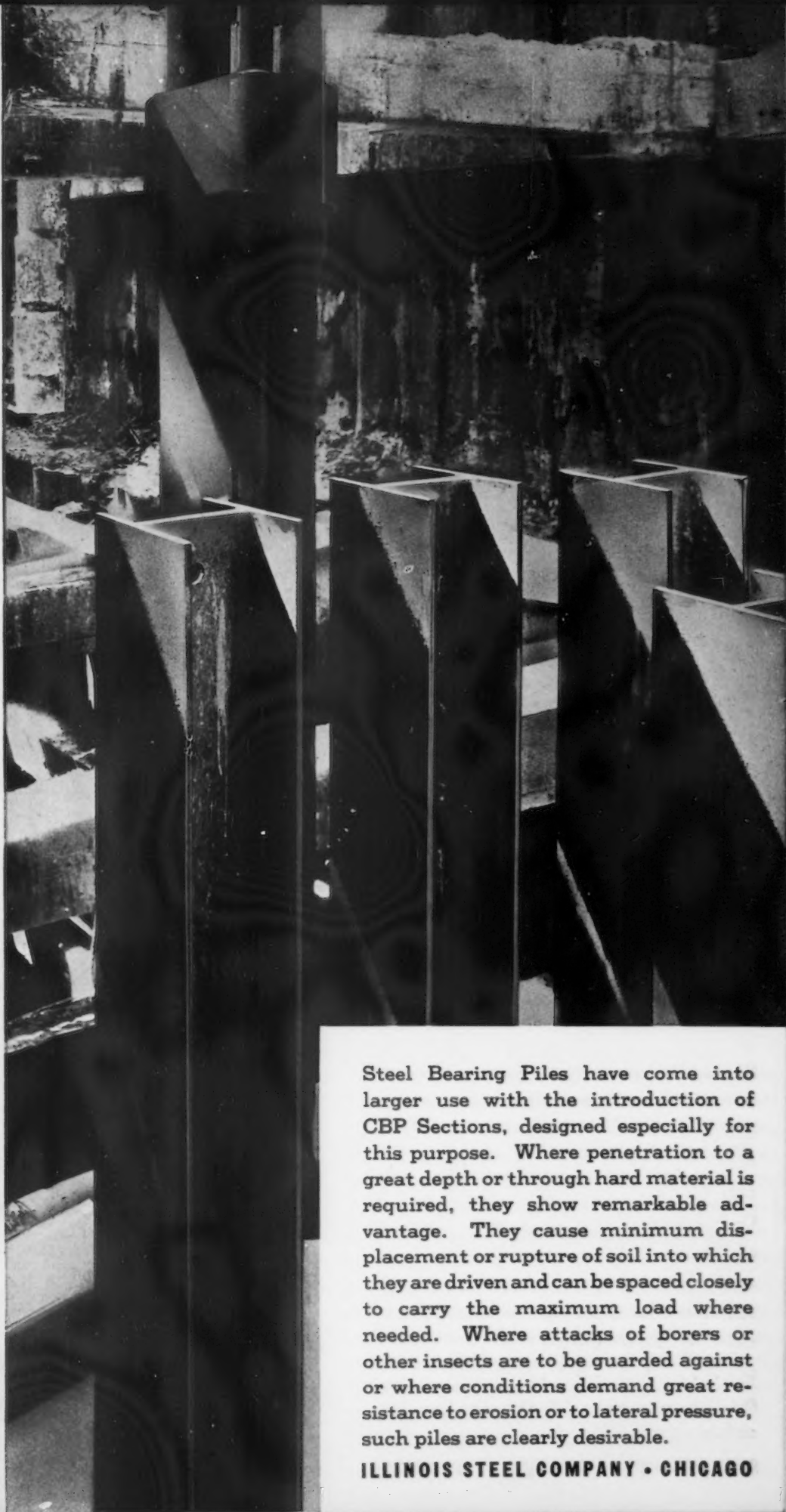
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The Vast Territory centering in Chicago, where structural steel was first used, is now served by the extensive and modern facilities of Illinois Steel Company. The manufacture of high grade steels for special uses has been a distinct service of Illinois Steel Company to industry in this area and beyond. From open-hearth steel of standard specification to USS 18-8 and other alloys, these products cover a wide range and represent a great accumulated fund of technical knowledge and practical experience, which are always at the command of the user.

For the building field, Illinois products include a complete line of standard rolled sections as well as the popular CB sections, column base plates, CBP bearing piles, steel sheet piling, rolled steel plates, bars and small shapes.

Illinois Multigrip Floor Plates are a recent development embodying the utmost in security and efficiency at moderate cost. Their merit is that from whatever angle the foot may strike, it will find its tread secure. Multigrip is easy to walk on, easy to work on, and is readily cleaned. Ideal for stair treads, factory floors, elevated walkways, sidewalk openings and many other uses.

This Company has gathered abundant data on the applications, properties, and the most successful technique for using its products. On any specification, large or small, advice will be gladly given.

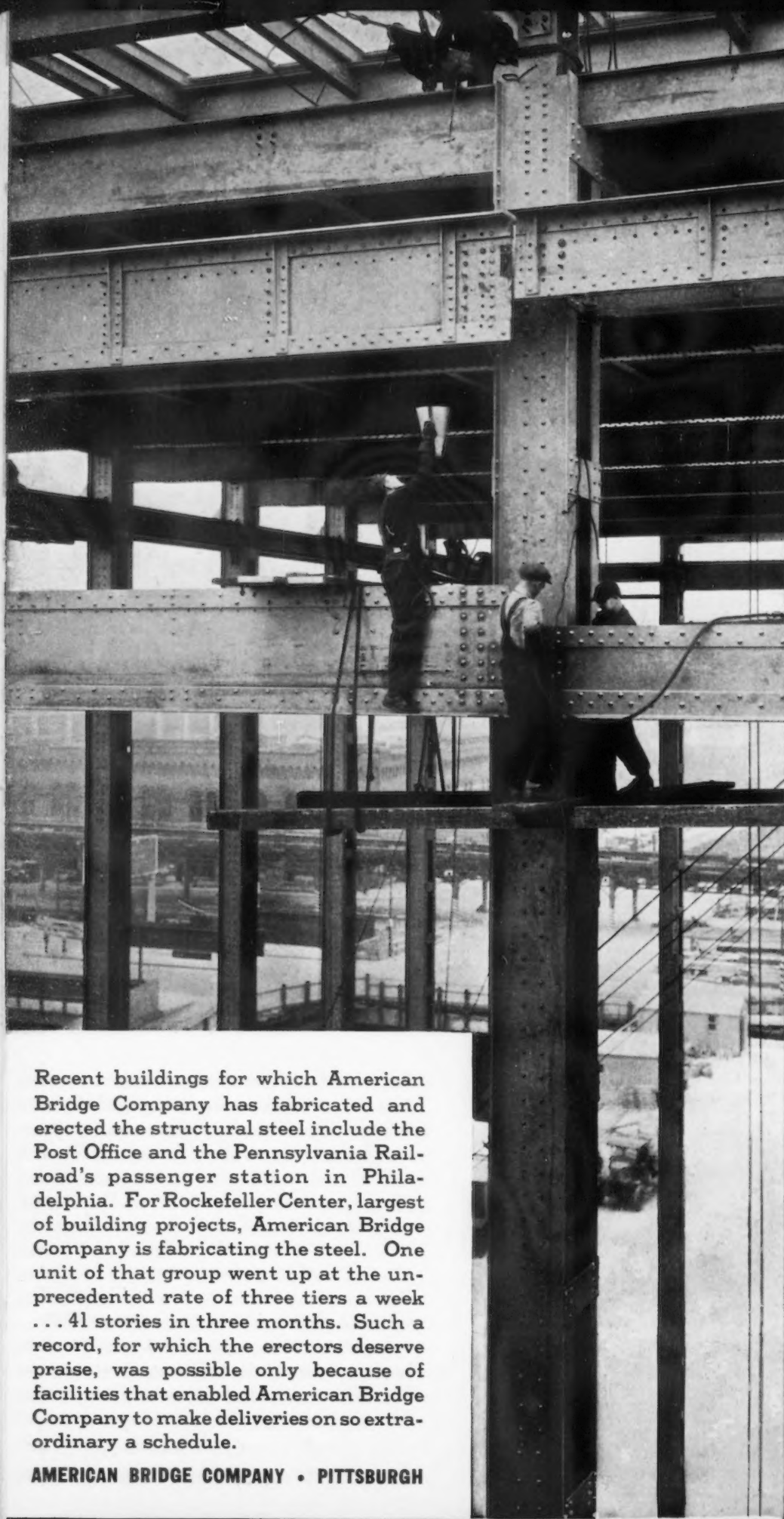


Steel Bearing Piles have come into larger use with the introduction of CBP Sections, designed especially for this purpose. Where penetration to a great depth or through hard material is required, they show remarkable advantage. They cause minimum displacement or rupture of soil into which they are driven and can be spaced closely to carry the maximum load where needed. Where attacks of borers or other insects are to be guarded against or where conditions demand great resistance to erosion or to lateral pressure, such piles are clearly desirable.

ILLINOIS STEEL COMPANY • CHICAGO

**STRUCTURAL STEEL • CB SECTIONS
BEARING PILES • STEEL SHEET PILING
COLUMN BASE PLATES • FLOOR PLATE**

**US
STEEL**



Recent buildings for which American Bridge Company has fabricated and erected the structural steel include the Post Office and the Pennsylvania Railroad's passenger station in Philadelphia. For Rockefeller Center, largest of building projects, American Bridge Company is fabricating the steel. One unit of that group went up at the unprecedented rate of three tiers a week . . . 41 stories in three months. Such a record, for which the erectors deserve praise, was possible only because of facilities that enabled American Bridge Company to make deliveries on so extraordinary a schedule.

AMERICAN BRIDGE COMPANY • PITTSBURGH

The Structural Steel Framework of great buildings has been fabricated and erected by American Bridge Company, or ABC-fabricated for erection by other companies, in so many cases that it might seem like undue self-glorification even to list them. Empire State Building, Rockefeller Center, the Philadelphia Post Office and the still larger one in Chicago, the magnificent new railway passenger stations in Philadelphia and Cleveland; important new freight terminal structures in New York and elsewhere are a few of the more recent examples.

Besides buildings and bridges, American Bridge Company also designs, fabricates, and erects steel dams of varying types, elevated and subway structures, turntables, barges and other floating equipment, electric furnaces (Heroult type), transmission towers and poles, substations, and many forms of special construction.

For any requirement, large or small, in which structural steel is involved, the services of American Bridge Company are always available and its facilities will be found adequate.

Carnegie Steel Company, Illinois Steel Company, American Steel and Wire Company, and other subsidiary manufacturing companies of the United States Steel Corporation furnish rolled sections, cables and wire, and other products used in the many structures for which American Bridge Company is responsible.



FABRICATION AND ERECTION OF
STRUCTURAL STEEL FOR BUILDINGS,
BRIDGES AND SPECIAL PROJECTS



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Wire Rope Must "Take

It" at every point—from the deepest excavation to the highest hoist. The approved Wire Rope must endure strains by which any but the toughest and strongest of materials would be destroyed. The preferred Wire Rope is the one that, under such conditions, will show long, uninterrupted service, at a clear saving in cost. Superior economy, proved by records of actual use in many fields, through many years, has established Tiger Brand Wire Rope as standard. It is smooth-running, easy on sheaves and drums, and every way conducive to efficient use where such advantages are important. Made to suit any and every purpose for which wire rope is employed, in either the erection or the operation of a building, it has always kept abreast of every new demand of industry.

The core and fibre of concrete construction in various forms is Wire Fabric—concrete floor slabs are an example. In many recent buildings, Rockefeller Center among them, AMERICAN Steel and Wire fabric of cold drawn wire has been used for reinforcing. This gives maximum strength and helps to make possible a proper distribution of weight in the structure. The fabric can be installed very rapidly and at very low cost, because of the exceptional ease with which it is handled.

American Steel & Wire Company's resources and organization for service are unexcelled. The plant equipment and facilities of the company enable it to meet the most exacting requirements in the manufacture of Wire and Wire Products for all uses.

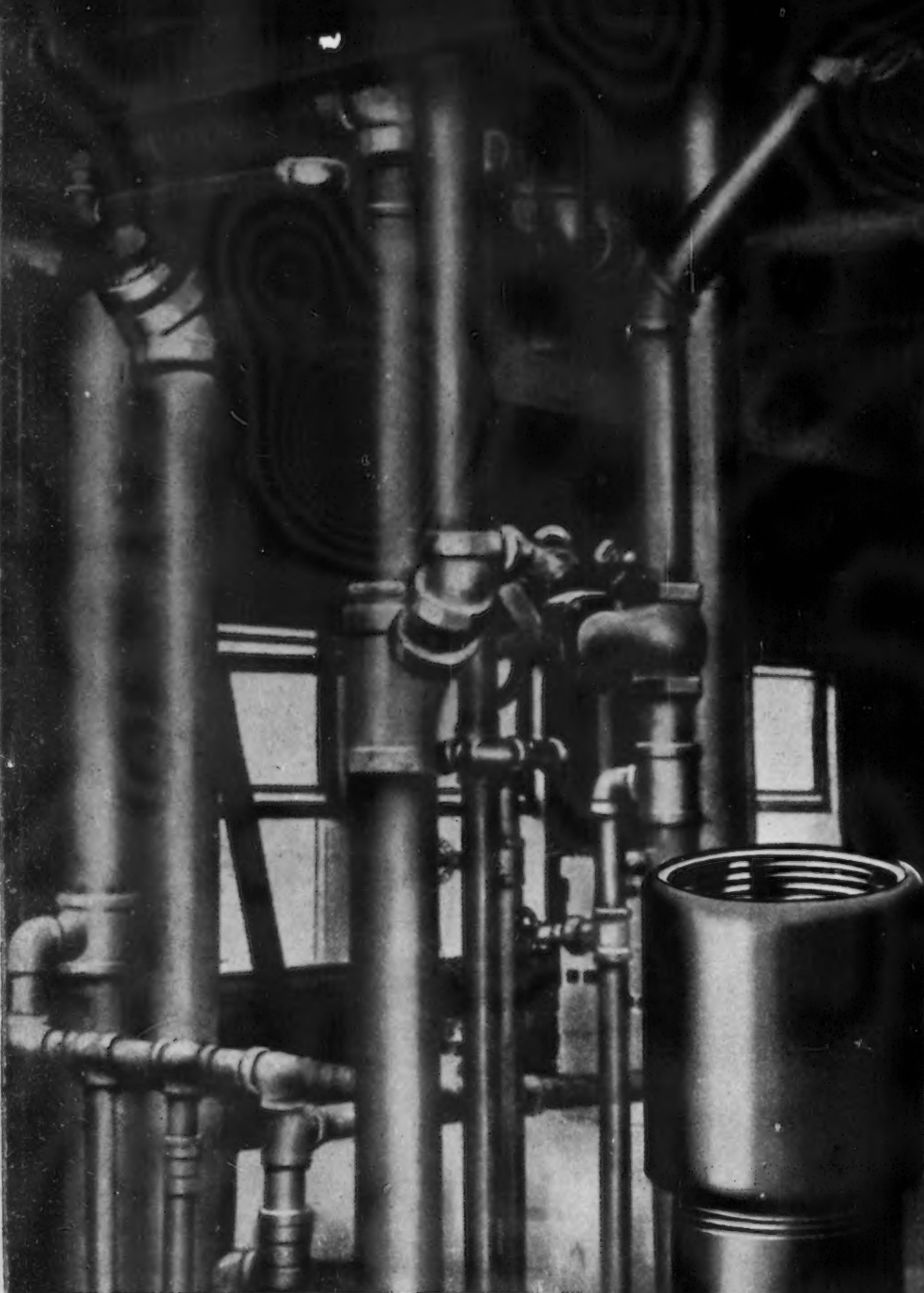


Wherever the hardest construction tasks are being done, you will find Tiger Brand Wire Rope at work on shovels, hoists, cranes, draglines, and other forms of equipment. In completed buildings, where elevators lift the heaviest freights or carry passengers to the greatest heights, Tiger Brand Wire Rope contributes to efficiency and safety. In the building field other American Steel & Wire Company products play a very important part. Wire Fabric, Electrical Wires and Cables, Wire Nails, Welding Wires are special products that may be mentioned.

AMERICAN STEEL & WIRE COMPANY
CHICAGO

WIRE ROPE AND FITTINGS • ELEVATOR CABLES
WIRE FABRIC FOR CONCRETE REINFORCEMENT
• ELECTRICAL WIRES AND CABLES • NAILS •

US
STEEL



Along with corrosion resistance and other factors leading to long life, handling and working qualities of pipe are important. If it can be installed with ease, it will be a big factor in economical and efficient construction. With well made, smoothly finished **NATIONAL** Pipe, threading, cutting, installing, tightening up and final inspection are so quickly accomplished that the immediate gain is very clear.

The property owner's interest also is better served, because of the extra tight, extra secure, extra durable job that results when **NATIONAL** Pipe is installed.

NATIONAL TUBE COMPANY • PITTSBURGH

Pipe is Too Important

in modern building construction and building maintenance to be any longer regarded as a minor accessory. To provide heat, water, gas, air, drainage... be the project large or small, pipe must function continuously; and it is therefore installed with a view to permanent service during the useful life of the building.

Two enemies of pipe, however, are often encountered in these services. They are atmospheric corrosion and the action of corrosive waters.

To protect hot and cold water lines against active waters, effectively and at little cost, **National Tube Company** has developed **Duroline Pipe**. **Duroline** is an improved cement lining... more adherent, less soluble, less affected by shrinkage, and more satisfactory in use than any heretofore known. It is immune to city and industrial waters, salt water, and a well defined range of chemical solutions. **Duroline Pipe** has proved satisfactory under a wide range of temperatures and other variations in service and can be recommended with confidence.

To resist atmospheric corrosion, or the effect of alternate wet and dry conditions **NATIONAL Copper-Steel Pipe** is both effective and economical. Thousands of service records from all parts of the country, covering more than 20 years, prove the value of copper-steel.

Pipe for piling, in the building field and elsewhere, has won increasing favor during recent years. **NATIONAL Piles** have been used in some of the country's largest projects.

These and other products of **NATIONAL** research and experiment have aided the architectural and engineering professions in keeping abreast of new demands. **NATIONAL Pipe** represents the skill, facilities, organization, and pride of reputation of the largest manufacturer of tubular products in the world.

**US
STEEL**

PIPE COUPLINGS AND TUBULAR PRODUCTS FOR WATER, HEAT, GAS, AIR AND DRAINAGE LINES • BOILER TUBES



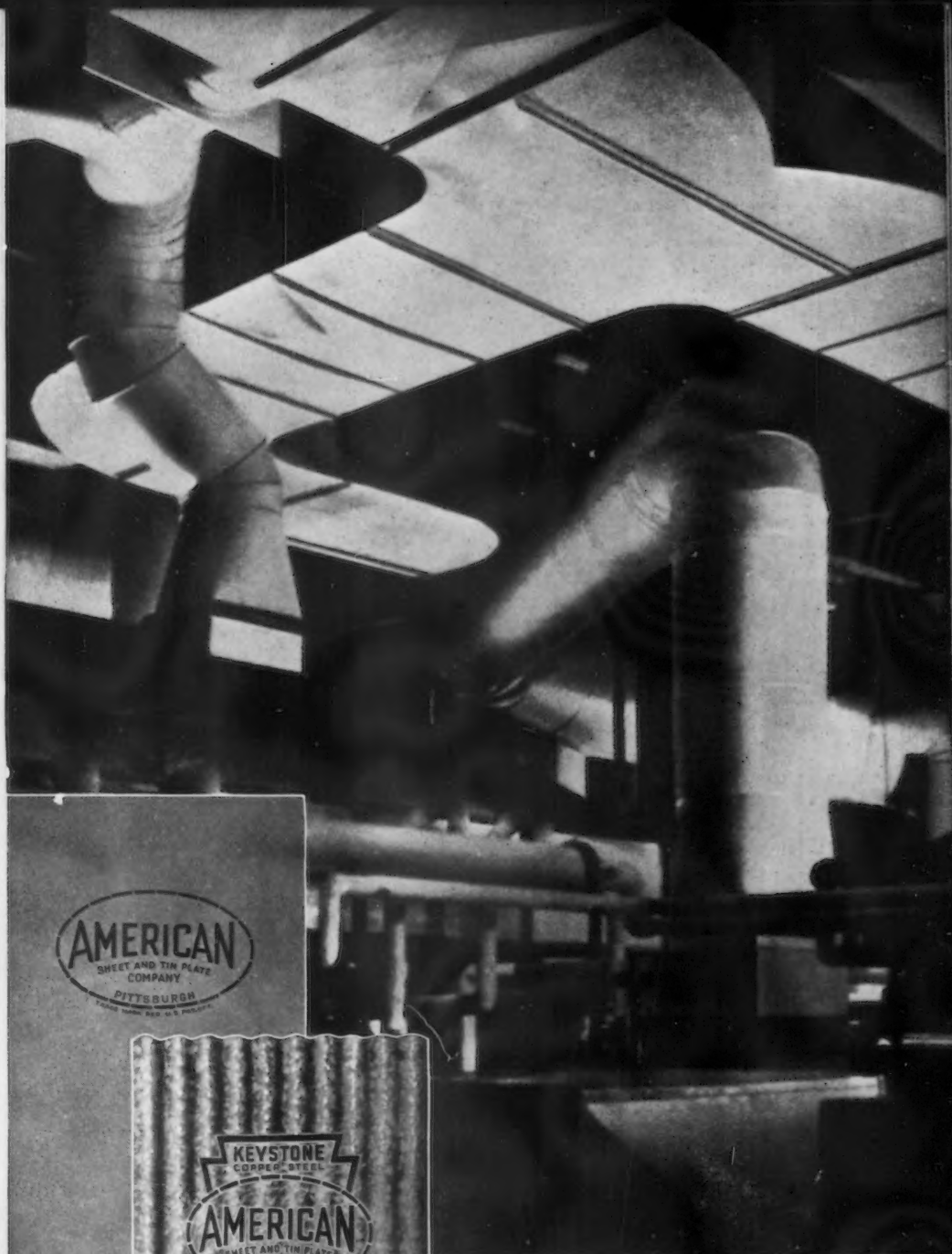
Both New and Long-Approved Applications—Roofing, Siding, Cornices, Door Frames, Window Frames, Metal Lath and Panel Sheets, light, built-up Floor Beams, Heating, Ventilating and Air Conditioning Ducts and various other equipment are represented in the building uses of AMERICAN Steel Sheets.

Improved sheets and light plates of varying composition are offered in a great range of dimensions, gauges, and finishes for different requirements—hot-rolled and cold-rolled; of plain carbon steel or copper-steel; black, galvanized, and extra-heavy zinc-coated, tin and terne coated; flat, and specially formed for roofing requirements.

Electrical sheets and special enameling sheets are of direct and indirect importance to building.

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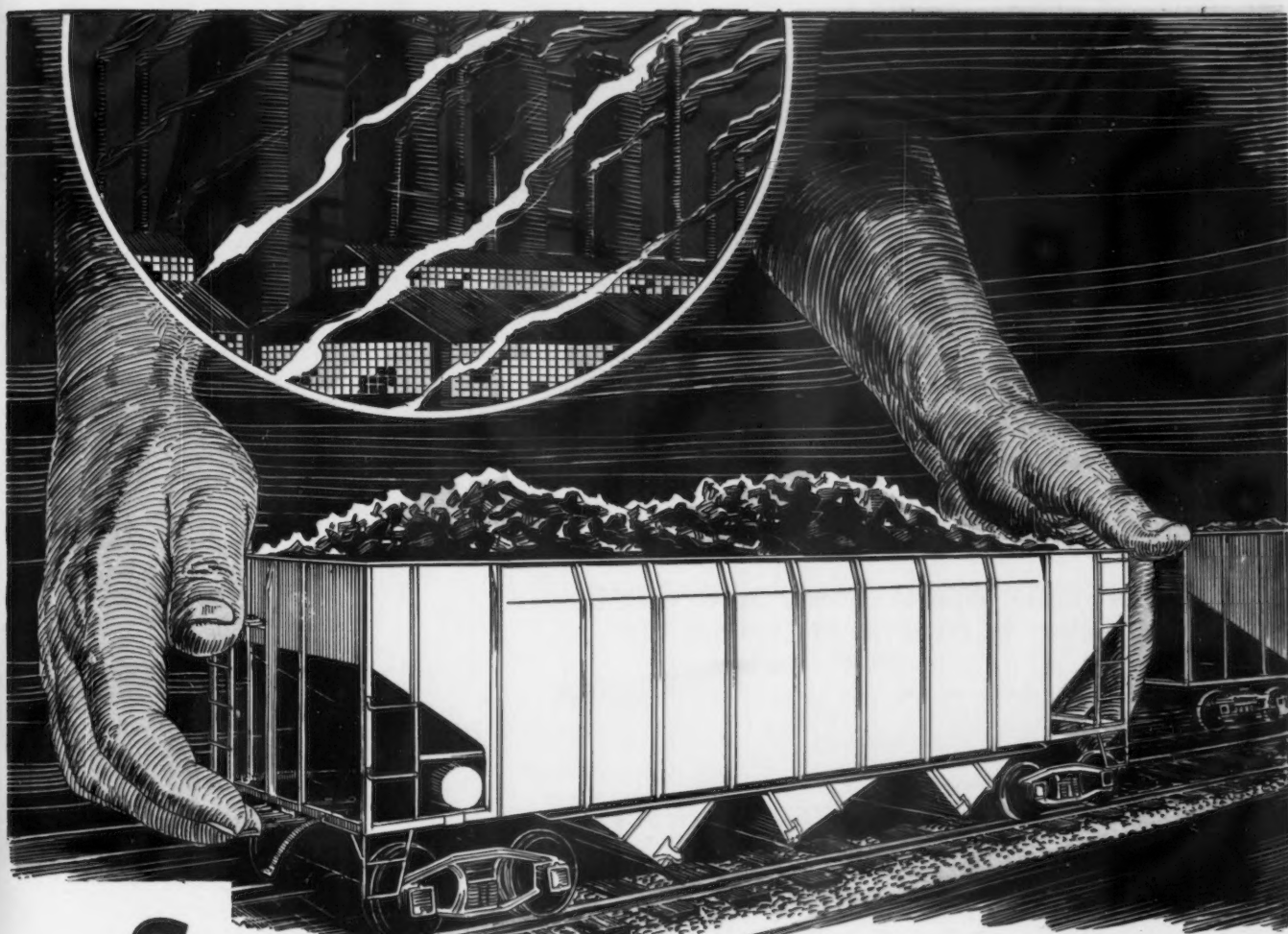
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Plates, Bars and Semi-Finished Products
- * **ILLINOIS STEEL COMPANY • CHICAGO**
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Submersion Time Versus Quality of Hot-Dip Zinc Coatings

(CONTINUED FROM PAGE 17)

practical evidence on this phase of zinc coatings that the longer the submersion time in the zinc bath, the higher the iron content in the zinc coating; and, the opposite, the shorter the submersion time in the galvanizing bath, the lower the iron content of the zinc coating.

The tremendous task of separating all of the factors and conditions in hot-dip galvanizing can be readily seen when we consider the gage of the base material, the bath temperature, the withdrawal time, the pickling time, and in fact dozens of other factors involved in the process of galvanizing from start to finish. To make matters more complicated the same results occur due to entirely different conditions, and this makes it sometimes almost impossible to discover which one of the galvanizing principles has been the cause of the result found.

Turning to the relation of the weight of the coating deposited in relation to the submersion time in the galvanizing bath, a distinct, clear relation exists. The graph in Fig. 4 shows the results of a very careful series of tests made

by varying the submersion time of a standard article with all other galvanizing conditions standardized. The articles were then weighed in order to secure the actual amount of zinc deposited for different submersion times.

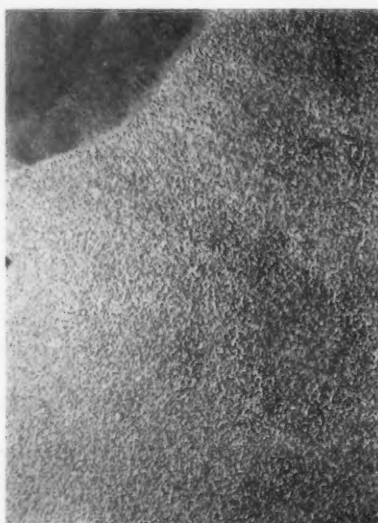


FIG. 3—Zinc coating produced on a 28 gage steel sheet held in bath for exactly 4 min. The bath temperature was 790 deg. F., as in Figs. 1 and 2.

The bath temperature for all the tests was held at 875 deg. F. The submersion times were taken with a stop watch reading in one hundredths of a minute, and all the tests were conducted in a full-sized galvanizing pot under practical conditions. The articles were all carefully weighed and the results plotted, as shown in Fig. 4. The number of minutes submersion time in the galvanizing bath is shown vertically at the left side and the number of pounds of zinc deposited per gross of articles is shown horizontally. It is evident that the longer the articles were submerged in the galvanizing bath, the more zinc was deposited as galvanized coating.

The definite galvanizing principle illustrated by these tests as shown by the graph is that the longer the submersion time in the galvanizing bath, the heavier the zinc coating deposited; and, the opposite, the shorter the submersion time in the galvanizing bath, the lighter the zinc coating deposited.

Each one of the factors discussed is in itself an extensive subject, and much research work has been done to obtain fuller knowledge pertaining to causes and effects. When it is considered that temperature changes directly affect results, and that in addition to the different gages of the steel base there is also the different kind of steel in the base, and also many different finishes, the extent of the field may be realized.

In order to merely illustrate the principle cited, just enough data and information will be given to support it. Tests have been devised to discover the various bending properties of the zinc coatings which were made under different standardized and definitely controlled conditions. A ductile coating was represented by the figure one; a poor, or more or less brittle coating, was given the number two. The test samples included every submersion time from 10 sec. to 120 sec., many different gages of steel base, and four different kinds of steel with different finishes. The results of this test alone are voluminous, so that the example cited will be 28-gage sheets, of one-pass cold-rolled steel stock, with submersion times varying from 10 sec. to 120 sec.

The accompanying table shows the results of bending the various
(CONTINUED ON PAGE 126)

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zinc coatings made with different submersion times.

Attention is called to the fact that when the steel was galvanized in a bath of new zinc the better zinc gave it better bending qualities. Also, it will be noted that when the sheets were coated in a bath of used, or old zinc, the definite brittleness was observed after a submersion time of 60 sec.

This test, with the other data not submitted due to time and space required, show conclusively two definite galvanizing principles, which are as follows:

(1) The newer the zinc used (or

better the quality of zinc) the more ductile the coating will be; and the opposite, the older the galvanizing bath, and the older the zinc, the more brittle the coating will be.

(2) The longer the submersion time in the galvanizing bath, the more brittle the zinc coating will be; and, the opposite, the shorter the submersion time in the galvanizing bath, the more ductile the coating will be.

Glossy Coating After 40 Sec.

This phase of the submersion time can be seen directly from Figs. 1, 2 and 3. There is a defi-

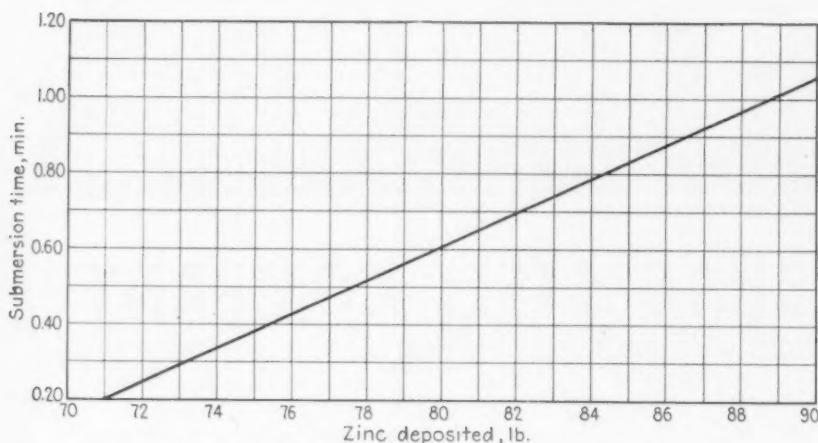


FIG. 4—The influence of the submersion time on the weight of zinc deposited. The bath temperature was 875 deg. F., and the weight of zinc deposited for each time interval was determined in a full-sized galvanizing pot under practical operating conditions.

nite time limit in the bath to give the smoothest zinc coating. When the submersion time is too long the coating gradually becomes saturated with iron and takes on the rough, dross-like appearance so well shown in Fig. 3. The brittleness of the coating is shown by the corner broken off from the sheet.

As a result of this test, a definite galvanizing principle on the smoothness of zinc coatings is available. This is as follows: The longer the submersion time in the galvanizing bath, the rougher the zinc coating will become; and, the opposite, the shorter the submersion time in the galvanizing bath, the smoother the zinc coating.

Many tests have shown that the brightness of a coating, or its luster, is also affected by the different submersion times in the galvanizing bath. Here again is such a host of detail, such a mass of data, that only the bare results can be given at this time. Careful studies as to the gloss, or shine, or luster of the zinc coating have shown that the gloss on the zinc coating begins to appear after 40 sec. submersion time, and that the longer the submersion time up to about 2 min., the more glossy the finish will be.

The examination of many coatings arranged according to different submersion times in the galvanizing bath shows that there is a definite galvanizing principle behind the luster that is found on zinc coatings. In relation to the submersion time in the galvanizing bath, this principle is the following: The longer the submersion time in the galvanizing bath, the more glossy the coating; and, the opposite, the shorter the submersion time, the duller the coating.

It should be noted, however, that this principle is limited as follows: The gloss of the zinc coating begins to appear at about 40 sec. submersion time and up to about 2 min. submersion time the gloss improves; beyond this the gloss and finish of the coating deteriorate and become grainy, rough and dull.

The adherence of the coating to the base metal is an extremely important factor in certain fields of galvanizing, such as that of electrical conduit in the field of pipe galvanizing. Peeling and flaking

(CONTINUED ON PAGE 128)

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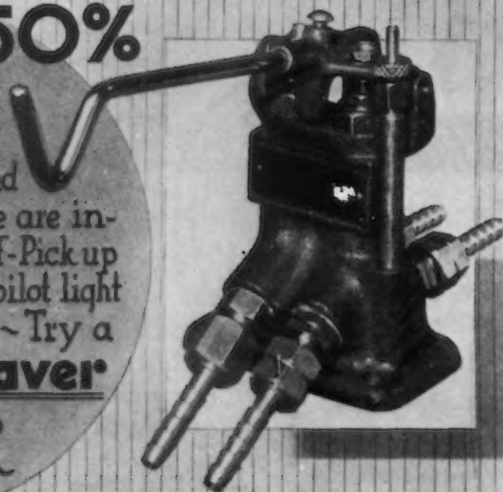
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are caused by many conditions, but at this time interest is centered on only one of them, namely, the relation that the submersion time in the galvanizing bath has to the adherence of the zinc coating to the base metal.

A quick examination again of the three illustrations will at once reveal the truth of the principle cited under this heading, namely, the longer the submersion time in the galvanizing bath, the lower the adherence of the zinc coating to the base metal; and, the opposite, the shorter the submersion time in the galvanizing bath, the better the adherence of the zinc coating to the steel base.

It can be seen at once, after reading the information herein submitted, that the great difficulty

in galvanizing engineering is to locate the right cause for any given result obtained. The same result may be obtained sometimes from 10 or more causes, and the only way that the trouble can be remedied is to check up on all the causes. For example, the submersion time might be very short and still a very brittle coating be obtained. A check-up on the quality of the zinc in the galvanizing bath perhaps might show it extremely high in iron content. This would also give a very brittle coating with a low adherence to the steel base. In order to try and present the art of galvanizing as a definite science, the following definite galvanizing principles in relation to the submersion time and the zinc coating are summarized:

(1) SPANGLE: The shorter the time of submersion in the galvanizing bath, the smaller the spangle; and, the opposite, the longer the time of submersion in the galvanizing bath, the larger the spangle.

(2) NON-SPANGLED COATINGS: The longer the submersion time in the galvanizing bath, the rougher the zinc coating.

(3) THICKNESS OF COATING: The longer the submersion time in the galvanizing bath, the thicker the galvanized coating will be; and, conversely, the shorter the submersion time in the galvanizing bath, the thinner the galvanized coating will be.

(4) IRON CONTENT OF COATING: The longer the submersion time in the zinc bath, the higher the iron content in the zinc coating; and, the opposite, the shorter the submersion time in the zinc bath, the lower the iron content in the coating.

(5) WEIGHT OF COATING: The longer the submersion time in the galvanizing bath, the heavier the zinc coating deposited; and, the opposite, the shorter the submersion time in the zinc bath, the lighter the zinc coating deposited.

(6) BENDING QUALITIES OF COATING: (a) The newer the zinc used (or better the quality of the zinc), the more ductile the zinc coating will be; and the opposite, the older the zinc, the more brittle the coating will be. (b) The longer the submersion time in the galvanizing bath, the more brittle the zinc coating will be; and, the opposite, the shorter the submersion time in the galvanizing bath, the more ductile the coating will be.

(7) SMOOTHNESS OF COATING: The longer the submersion time in the galvanizing bath, the rougher the zinc coating will become; and, conversely, the shorter the time of submersion in the galvanizing bath, the smoother the zinc coating will be.

(8) LUSTRE OF ZINC COATING: The longer the submersion time in the galvanizing bath, the more glossy the coating; and, the opposite, the shorter the time of submersion in the galvanizing bath, the duller the coating. (The gloss begins to appear at about 40 sec. submersion time; beyond 2 min. submersion time deterioration sets in.)

(9) ADHERENCE OF ZINC COATING: The longer the submersion time in the galvanizing bath, the lower the adherence of the zinc coating to the base metal; and, the opposite, the shorter the submersion time in the galvanizing bath, the better the adherence to the steel base.

Results of Bending Tests on Galvanized Coatings on One-Pass Cold-Rolled Steel

1 = Ductile Bath Temperature, Deg. F.	Time of Sub- mersion in Seconds	Brand New Zinc Bath	2 = Brittle Old Zinc in Bath
820	10	1	1
820	20	1	1
820	30	1	1
820	40	1	1
820	50	1	1
820	60	1	1
820	70	1	2
820	80	2	2
820	90	1	2
820	100	2	2
820	110	2	2
820	120	2	2